TRANSACTIONS

OF THE

AMERICAN INSTITUTE,

OF THE

CITY OF NEW YORK,

FOR THE YEARS

1860-61.

ALBANY:
C. VAN BENTHUYSEN, PRINTER.
1861.

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AMERICAN INSTITUTE.

Trustees and Committees.

1860.

President.—WILLIAM HALL.

Vice Presidents.—*John A. Bunting, John Gray, Dudley S. Gregory.

Recording Secretary.—Henry Meigs.

Corresponding Secretary and Agent.—Thomas McElrath.

Treasurer.—Benedict Lewis, Jr.

Finance Committee.—S. R. Comstock, P. H. Titus, Chas. A. Whitney, John M. Reed, George F. Nesbitt.

Managers of the Fair.—Wm. Ebbitt, Thos. F. DeVoe, Wm. H. Butler, James C. Baldwin, Andrew Bridgeman, John V. Brower, Thomas W. Field, George Timpson, John Johnson, Thomas Williams, jr., Wm. H. Slocum, John W. Avery, Edwin Smith, John B. Peck, T. F. Engelbrecht, Wm. D. Andrews, Cyrus Mason, James Knight, Wm. S. Carpenter, Isaac M. Phyfe, O. Cleveland, George Peyton, Harvey Hart, James Y. Watkins.

Committee on Agriculture.—A. P. Cumings, Simeon Leland, Nicholas Wyckoff, Chas. A. Stetson, Adrian Bergen.

Committee on Commerce.—Luther B. Wyman, Rush Patterson, N. B. Mountfort, Wm. K. Strong, Wm. Cotheal.

Committee on Manufactures, Science and Art.—James Renwick, Edward W. Serrell, John D. Ward, Benj. Aycrigg, Benj. Garvey.

Committee on the admission of Members.—Robert Lovett, James F. Hall, Henry Meigs, Jno. W. Chambers, Wm. H. Beebe.

Committee on Correspondence.—John H. White, Hiram Dixon, Henry L. Stuart, Clarkson Crolius, George F. Barnard.

Committee on the Library.—Wm. Hibbard, Lewis A. Sayre, Edward Walker, Jno. W. C. Leveridge, Charles A. Seely.

Committee on Repository.—Martin E. Thompson, James Bogardus, Wm. Close, J. K. Fisher, T. D. Stetson.

Clerk and Librarian.—John W. Chambers.

Messenger.—William C. Miller.

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* Deceased—Wm. Hibbard elected to fill vacancy.

Managers of the Fair.—James C. Baldwin, Wm. H. Butler, Wm. Ebbitt, Thomas F. De Voe, John V. Brower, George Timpson, John Johnson, Thos. Williams, jr., Andrew Bridgeman, John B. Peck, Isaac M. Phyfe, T. F. Engelbrecht, Wm. S. Carpenter, George Peyton, James Knight, Cyrus Mason, Wm. Cotheal, Henry Steele, Geo. M. Woodward, Geo. R. Jackson, John D. Jersey, Chas. Perley, Clarkson Crolius, Chas. A. Whitney.

Committee on Agriculture.—A. P. Cumings, Nicholas Wyckoff, Charles A. Stetson, Adrian Bergen, Wm. Lawton.

Committee on Commerce.—Luther B. Wyman, Rush Patterson, N. B. Mountfort, Wm. T. Pinkney, Joseph Hoxie.

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STATE OF NEW YORK.

No. 138.

IN ASSEMBLY,

March 13, 1861.

TRANSACTIONS OF THE AMERICAN INSTITUTE.

AMERICAN INSTITUTE,
NEW YORK, *March* 12, 1861.

To the Hon. D. C. LITTLEJOHN, *Speaker of the Assembly:*

SIR :—I herewith transmit the Annual Report of the American Institute of the city of New York, for the years 1860-61.

Very respectfully, your obed'nt servant,
THOMAS McELRATH,
Corresponding Sec'y.

REPORT OF THE TRUSTEES.

The undersigned, Trustees of the American Institute, in conformity with law, beg leave to present their Annual Report for the years 1860–61:

The general proceedings of the Institute during the year were conducted on the same plan and were not essentially different from the proceedings of former years.

The department of the Institute devoted to the more immediate interests of Agriculture, has been well sustained during the year by the Farmers' Club. The weekly discussions were numerously attended; rare seeds of vegetables, grains and flowers were extensively distributed, and grafts of approved varieties of fruit were very freely exchanged by farmers and fruit growers. The discussions and reports of this Club will be found both interesting and useful.

The Polytechnic Association, whose province is more particularly restricted to subjects connected with general science, has improved in its organization and in its plans of operation during the year, and now bids fair to render an important and useful service to the American mechanic. This Association occupies a very responsible position, and has attained a prominence which gives to its discussions a public interest. The proceedings of this Association, which are conducted under the supervision of the Committee of Manufactures, Science and Art of the Institute, will be found important.

The Annual Fair, though less general in its character than usual, was, nevertheless, creditable to the Institute and satisfactory to the public. The Report of the Board of Managers exhibits the details. The Report of H. S. Olcott, Esq., on the flowers, plants and fruits exhibited at the Fair, will command attention.

The efforts of the Trustees to obtain suitable grounds or buildings for the permanent use of the Institute, were not successful. Whether it is possible to obtain as many lots or as much space

as is required for the Annual Fairs anywhere within reasonable distance from the business portion of the city, with the limited means which the Institute can devote to that purpose, is, at the present day, somewhat doubtful.

For more than 30 years the Annual Fairs of the Institute have attracted to the city many thousands of strangers, and the opinion has long been entertained that the authorities recognizing the advantages which the city has derived from the Fairs, would furnish the necessary grounds on which the Institute might erect appropriate buildings. This hope is not yet abandoned; the city has it in its power to put the Institute into possession of grounds admirably well adapted to its wants, and the Institute has sufficient means to erect thereon the necessary buildings.

It is ardently hoped that the mutual benefits so obviously to be derived from this suggestion may lead to mutual co-operation, and the desired result be consummated between the Common Council and the American Institute within the coming year.

The financial affairs of the Institute has improved during the year; there is now no floating debt against it, and its liabilities are about $4,000 less than they were the previous year.

The Library is in an improved condition, and continues to be a popular and useful branch of the Institute.

WILLIAM HALL,
JOHN GRAY,
DUDLEY S. GREGORY,
WILLIAM HIBBARD,
THOMAS McELRATH,
HENRY MEIGS,
BENEDICT LEWIS, Jr.

Trustees.

PROCEEDINGS OF THE INSTITUTE.

ADDRESS OF THE PRESIDENT.

The first meeting of the Institute after the annual election in February, was held on the first day of March. The president elect, General William Hall, on assuming the duties of the office, addressed the members as follows:

On taking my seat for the first time as your presiding officer, it may not be improper that I should offer a few remarks.

The American Institute was incorporated for the purpose of encouraging and promoting domestic industry in this State and the United States, in agriculture, commerce, manufactures and the arts, and any improvements made therein, by bestowing rewards and other benefits on those who shall make any such improvements, or excel in any of said branches.

A purpose which identifies itself so closely with the best interests and prosperity of our country, is worthy the earnest consideration and co-operation of every good citizen.

In any plans or suggestions I may offer, either at this time or during the course of my official career, I trust that those who cannot conscientiously concur will, at least, do me the justice to believe that my sole purpose is to carry out, in the best manner, the design of our charter, organized in February, 1828. The American Institute has now been in existence over thirty-two years, and is the parent institution of the kind in America, and not only for its age but for its general success it is justly looked up to and regarded as a model in the commercial metropolis of the country, the great centre of wealth, and where every department of science and industry must centre and claim its rewards; such an institution is almost a necessity, and if conducted, in its various departments, by competent and skillful men, who, without expectation of pecuniary gain, will dare to speak and act the truth and give to merit and genius its just reward, its salutary influences will be felt throughout the length and breadth of

the land, and its endorsement will be of real value when and wherever it is bestowed.

However much good we may have accomplished, we have yet much to do, to gain and to sustain this prominent position, and in forming our plans for the future let us not forget that our first step is to consider the errors and shortcomings of the past.

I would not presume to dictate all the plans by which these results may be attained, but a few which have presented themselves to my mind may be worthy your consideration.

The evils of over legislation, which appears to be a pervading evil of the day, is a fruitful cause of internal weakness. Our monthly meetings, instead of possessing the dignity of men who have met together to promote the cause of science, industry and truth, partake too much of the character of mere political gatherings, where personal ambition and the spoils are the main spring of action, and thus a spirit of partizanship has arisen which diverts the minds of our members from the true interests of our organization.

There is scarce a meeting but some change of by-law is demanded which, in too many instances, is, I fear, rather intended to carry out the design of a faction than to promote the general good.

There are cases where such amendments have been made, and in a short time, or when the purpose for which the change had been made was accomplished, they have been changed back to their original form.

Such things will demoralize any association, and they have kept from our meetings many who would otherwise take a deep interest in our affairs, and whose council and advice would be of great value; many of our best members are unwilling to attend the meetings, and become parties to, or spend their time in such scenes as too often occur on these occasions.

I trust that the committee who now have charge of framing a new code of by-laws may, in their wisdom, report such an one as will for a long time need no changes hereafter, and should any changes be contemplated, that they shall be made only at the annual meetings, and that they shall be presented at least three months previous, in writing, signed by at least five members, and that a printed notice of the same shall be sent to every member of the Institute.

I think that the interests of the institution would be much

better served by quarterly than by monthly meetings, arranging for special meetings in cases of emergency.

Another subject has long occupied my mind; I would urge upon your consideration that of having either in our own possession, or under our control, suitable premises for holding our annual exhibitions. No real or reliable prosperity can ever be achieved until this is accomplished. In the minds of the public the Institute will have no positive existence without it, and each year we become more dependent on the chance of finding a location for our exhibition; when found they are at the best a mere apology for what we really need, and while it depreciates their interest, it subjects us to expenses entirely disproportionate to the accommodations furnished.

Claiming your kind indulgences for any mistakes I may make in the official discharge of my duties, I again assure that my only desire is to promote the usefulness and efficiency of our institution.

REPORT

ON THE FIELD OF THE FUTURE LABORS OF THE AMERICAN INSTITUTE.

The committee to whom was referred the resolution of January 5th, 1860, "On the Field of the future labors of the American Institute, and the suitable manner and place of their performance," offer the following report:

The ingenuity and toil of individuals have procured the material prosperity which has distinguished our country during the last thirty years. That ingenuity has been stimulated, and that toil rewarded, in part, by the American Institute. This encouragement of the National progress has earned from the State a just recognition. The names of the founders and sustainers of the Institute are placed in the public history of our young civilization, and will be read in future ages as we now read the names and deeds of ancient benefactors.

To us is assigned the easier task of improving the inheritance they have left us. Their sagacity and prudence have given us large means of usefulness, and the public expectation will justly require us to make a progress suitable to these means.

It is the tendency of a society fund to become a sinecure, or to be devoted to the special benefit of a class, although the express design of the accumulators was the advancement of knowledge; but there can scarcely be a doubt, in any mind, that the estate of the Institute should be prudently, but promptly, applied to a permanent establishment, adapted to the specific objects set forth in the charter, and to the special enlargement of the labors of the Institute, in whatever department of its appropriate work experience may suggest.

For the special purpose of the Annual, or less frequent, Fairs of the Institute, a place as remote as the site of the Crystal Palace might be available; but for all those ordinary labors, in which the Institute can have no rival in the rural districts—the

labors of fresh developments in science applicable to agriculture and the mechanic arts—there is need of a position in the very centre of greatest activity.

The collections in science and art would soon form an instructive museum. The number of farmers and mechanics habitually visiting the city would form a large and willing audience in every week of the year. And the frequent expositions of some specialty in science or invention would call for the habitual use of a great lecture-room, where both of the clubs and a general audience would render their discussions highly instructive to themselves, and widely useful through reports in the daily and weekly papers.

Within the future home of the Institute there should, if possible, be a chemical laboratory, where analyses should be made for farmers and mechanics; and why not for miners, merchants and the courts? Why should not the Institute aspire to maintain a laboratory for at least two constant investigators? There are rich men among us who would gladly connect their names with a permanent endowment for this purpose.

The field of original investigation is the mine of our future wealth. The openings already made indicate the sure rewards of future labor. The future economies in the preparation of manures, in the consumption of fuel, in the reduction of metals, and in the generation of power, are measures of the numbers of the human family, and of the comfort and leisure they shall enjoy. Schools which aim only to educate successors for those who die, bring on a stationary state, like that of China, and prepare the nation, sooner or later, to fall under the encroachment of progressive nations.

In this connection is it not possible for the institution to qualify and send out a class of agricultural missionaries—men, who might occupy a part of the time and attention now bestowed on barren sensation lectures; men, able and willing to give important practical directions to individual farmers, who, without such aid, are likely to repeat the errors of their fathers? The want of such a service is manifest, and ought to be supplied by men duly qualified.

The judgments given by any committee or club of the Institute, especially in cases between competitors, should, by all possible means, be such as to deserve the confidence of the public, and the acquiescence of the disappointed.

At the great fairs in Europe, it is an advantage that the judges

are drawn from different cities and countries. Is it not practicable to do something of this kind at our fairs? Whatever may be the mode of selection, it is obvious that the judges should be placed entirely above the interests and passions of competitors.

If it were possible to simplify the organization of the Institute, so that matters merely executive might be intrusted to a standing committee, or board of directors, comprising at least eight members more than the seven officers who are now directors, whose doings should be submitted to the meeting of members quarterly, or half yearly, the results would probably be satisfactory, and the monthly meetings of members might be available for scientific purposes.

If the building to be occupied by the Institute will conveniently allow it, there might be an apartment rented to some suitable person for the sale of the most rare and valuable articles recently brought into public notice in agriculture and mechanics. This would draw ingenious and inquiring men to the place, and give occasion to useful communication with people residing out of the city.

As all sciences are kindred, it is not improbable that other associations may find it desirable to secure a place within the buildings of the Institute. The Lyceum of Natural History has a collection of great value; if to this were added the ores and metals of more recent development, the whole might be made useful to the ends of general science, without incommoding the proper collections of the Institute.

The miscellaneous libraries of the city are now becoming so numerous and full that it may be best to limit our future collection of books to such as are specially appropriate to the uses and ends proposed in our charter.

C. MASON,
JAMES RENWICK,
ROBERT L. PELL,
WM. LAWTON.

At the regular monthly meeting of the Institute, held on Thursday evening, April 5, 1860, the foregoing Report was presented and read by the Chairman of the Committee. On motion, it was received by the Institute, and two hundred and fifty copies ordered to be printed for the use of the members.

AMERICAN INSTITUTE, NEW YORK, *April* 5, 1860.

FINANCES.

The following is the financial condition of the American Institute on the first day of February, 1861:

Balance in the treasury February 1, 1860		$207 22
The RECEIPTS of the past year have been—		
From rent of premises No. 351, Broadway, Nov. 1, 1859, to Feb. 1, 1861	$13,736 29	
Admission fees and dues from members	1,328 00	
Certificates of award	32 00	
Duplicate silver medal	5 00	
Bowery savings bank, bond and mortgage	4,000 00	
Treasurer of the State, under act of May, 1841, (for 1859)	950 00	
Sales of old iron, etc	125 63	
Papers, etc	38 35	
Canvas, etc	37 62	
Transactions	2 00	
		20,254 89
From Managers of the Thirty-second Fair, balance		1 23
Am't to be accounted for, includ'g last year's bal'ce,		$20,463 34

EXPENDITURES.

Real Estate.

Interest on mortgage to Feb. 1, 1861	$1,646 66		
Insurance	104 21		
Repairs of building, 351 B'y	19 33		
Taxes, 1860	1,355 84		
Searching title, etc	16 66		
Emptying sink	35 28		
		$3,177 98	
Carried forward,		$3,177 98	$20,463 34

Brought forward,		$3,177 98	$20,463 34
Bills Payable.			
Butchers & Drover's bank, for note discounted	$4,000 00		
Interest	44 01		
		4,044 01	
Library.			
Books	$70 73		
Periodicals	127 00		
Newspapers	57 12		
Binding books	17 02		
Binding catalogues	15 36		
		287 23	
On account of Thirtieth Annual Fair.			
Premiums, engraving	$37 50		
Books	18 44		
		55 94	
On account of Thirty-first Annual Fair.			
Premiums	$2,058 67		
Clerk-hire and labor	45 00		
Advertising	554 06		
Printing	299 82		
Stationery, etc	131 71		
Muslin for covering tables	48 84		
Use of crockery for fruit	18 65		
Lettering signs	19 65		
Putting fair ground in order for track	7 00		
Tools used at ditto	5 75		
Croton water	25 00		
Fuel—wood and coal	13 00		
Belting for engine	20 67		
Gasfitting, and lighting by electricity	152 15		
Cartage, washing muslin, etc.	16 25		
Use of glass case	10 00		
		3,426 22	
Carried forward,		$10,991 38	$20,463 34

Brought forward,		$10,991 38	$20,463 34
On account of Thirty-second Annual Fair.			
Cash advanced, per resolut'n	$500 00		
Printing	86 95		
Advertising	109 86		
Repairs of tent	30 00		
Tanks	38 40		
Lumber	93 86		
Sundries–	5 39		
Premiums:			
Silver ware	357 50		
Cash	70 50		
Diplomas	2 40		
Striking medals	54 00		
Engraving	43 00		
		1,391 86	
Miscellaneous Bills.			
Rent of rooms in Cooper Union Building, to Feb. 1, 1861	$2,187 50		
Fitting up rooms	199 30		
Advertising	55 25		
Printing	75 63		
Stationery	57 85		
Gas	80 45		
Freight on Transactions	7 58		
Agent's expenses at Albany	35 00		
Storage of articles	48 00		
Cartage of iron, etc	17 68		
Insurance on library	32 40		
" on goods in storage	5 00		
Use of store in Broadway	12 50		
Preparing reports—Polytecnic Association	80 00		
Watering square	7 00		
Petty Cash Expenses:			
Advertising meetings, subscript'n to papers, cleaning, postage, etc.	260 33		
		3,161 47	
Carried forward,		$15,544 71	$20,463 34

Brought forward,		$15,544 71	$20,463 34
Salaries.			
Corresponding sec'y and ag't, (14 months)	$1,750 00		
Recording secretary	1,000 00		
Clerk	1,500 00		
Librarian	116 67		
Messenger	184 00		
		4,550 67	
			$20,095 38
Balance in the treasury February 1, 1861			$367 96

S. R. COMSTOCK,
PETER H. TITUS,
CHAS. A. WHITNEY,
JOHN M. REED,
GEO. F. NESBITT.
Finance Committee.

Amount of property held by the American Institute, Jan. 31, 1861.

Real estate No. 351 Broadway and No. 89½ Leonard street, cost	$45,800 00	
Less mortgage	20,000 00	
		$25,800 00
Library and fixtures		13,202 93
Office furniture and fixtures, iron safes, case of specimens of fruit, &c		934 75
Property used at fairs		1,415 98
Gold and silver medals on hand		443 08
		$41,796 74
Cash in the treasury February 1, 1861		367 96
		$42,164 70

ANNUAL REPORT

OF THE LIBRARY COMMITTEE OF THE AMERICAN INSTITUTE, 1861.

The 47th section of the by-laws makes it the duty of the library committee to render to the Institute, at the stated meeting previous to the annual election, a full report of its doings; in conformity thereto, the committee respectfully submit the following report:

The annual fair of the Institute affords to most of it's members the means of rational enjoyment for a short period in each year. The Farmers' and Polytechnic Clubs give weekly opportunities to discuss much that is valuable and interesting. But the library is a constant source of intellectual pleasure and improvement, and a perpetual bond of union to all the members; it is the one permanent department of the Institute, and though permanent, yet constantly progressive.

The Committee take great pleasure in bringing to the knowledge of the Institute the general reputation which the library has acquired, on account of the select character of the general collection; and although the number of historical and miscellaneous works called for and taken out of the library during the year forms a large proportion, yet its usefulness and most beneficial effects are found in the daily consultation of its scientific works, by inventors, mechanics and professional men.

A collection more miscellaneous and discursive might attract a larger number of readers, but the objects contemplated by our charter, to wit: the promotion of agriculture, commerce, manufactures and the arts, would seem to indicate the propriety of giving to books connected with these and kindred subjects, the first place on their catalogue. When the published works on agriculture, the physical sciences, and practical mechanics, are all secured, classified and arranged on our shelves, it will be time enough to consider the subject of extending the list of light and miscellaneous literature.

The general policy marked out by the Committee for their action during the year, was to pay less attention to the purchase

of new books, than to the preservation of valuable old ones, and to the completion of imperfect sets of works of importance.

The present librarian has much improved the arrangement of the books on the shelves; the classification is simple, and thereby facilitates access to books in the different departments of science and literature.

Early in the year, the Committee ordered an examination of all the books on the shelves, and a careful comparison of the same with the catalogue. The time and labor bestowed upon this examination was well employed; of the 8,468 volumes in the library, only 5,732 had been recorded in the numerical catalogue, the balance being on sheets of loose paper; if these papers had been lost, no record would have been left to discover the numbers of the books contained thereon. No less than 530 volumes regularly numbered, and on the catalogue are missing—neither found on the shelves of the library, nor charged on the circulating ledger to members.

This examination and comparison disclosed the further fact that, there were in the library 237 volumes which were unnumbered and uncatalogued, no record or index of them whatever, to show that the Institute owned, or that the library possessed such works.

How far the loss of these books may be attributed to inattention or neglect, the committee have no means of ascertaining, but it is a source of sincere regret that Mr. Harris, the late librarian did not report the loss during his term of office.

The library contained, per the report of the library committee, made to the Institute, Feb. 2, 1860,

made to the Institute, Feb. 2, 1860,		8,468 vols.
From which should be deducted 62 numbers in the catalogue omitted	62	
Books not in the library as per list appended	530	
		592
Added this year:		7,876
By purchase	27	
Subscription	40	
Donations	44	
Exchanged	24	
Pamphlets	1	
		136
Total		8,012 vols.

The duplicate volumes and the novels ordered at the meeting held on the sixth of December, to be sold, are catalogued and at an early day will be offered at public sale.

The committee further report that there is on hand 62 copies of the catalogue, of which 12 copies are bound with the supplement, and 400 copies of the supplement in sheets. We recommend to our successors that a further supplement be prepared, containing the books added to the library since 1847.

Of the appropriation of $2,500 made in 1851, there still remains a balance of 246\frac{25}{100}$ unexpended, and at the disposal of the library committee.

The committee further report that they have distributed the volumes of Transactions of the Institute to members as they were called for, and have exchanged with foreign, kindred and other institutions about 100 copies.

All of which is respectfully submitted.

WM. HIBBARD,
EDWARD WALKER,
THOS. McELRATH,
Committee.

NEW YORK, *February* 6, 1861.

REPORT

OF THE BOARD OF MANAGERS OF THE THIRTY-SECOND ANNUAL FAIR OF THE AMERICAN INSTITUTE.

The Board of Managers of the Thirty-second Annual Fair of the American Institute, respectfully report

That the first meeting of the managers was held on the 24th day of February, 1860, and the board was duly organized by the appointment of Mr. James C. Baldwin, as chairman, Mr. W. H. Butler, as vice-chairman, Mr. Thomas McElrath, as corresponding, and Mr. John W. Chambers, as recording secretary. At this meeting there was a free interchange of opinions as to the propriety of holding any exhibition during the year. The heavy loss sustained by the Institute by the fair of the preceding year, and the great difficulty in procuring sufficiently ample accommodations were sufficient causes to demand of the managers a deliberate consideration of the subject before involving the Institute in heavy pecuniary liabilities.

For the purpose of arriving at a conclusion, a committee was appointed to examine and to report upon a proper building for a fair or exhibition on a large scale, embracing the entire range of the mechanic arts as well as the varied productions of agriculture and other industrial pursuits. This committee was also directed to report upon a suitable building for an exhibition or fair of less magnitude, at which horticultural and agricultural products only should be admitted.

The final action of the committee resulted in its reporting Palace Garden, in Fourteenth street, as the only place in the city which could be procured, and that the experience of the last year's fair was conclusive as to its insufficiency for the purpose of a general exhibition. The managers were reluctant to announce any other than the general mechanical fair, and it then became a serious question in the board whether it would be prac-

ticable or politic to announce any kind of an exhibition whatever.

The action of the Institute at its monthly meeting in June, relieved the managers from any further discussion of the subject. At that meeting the Institute declared it to be inexpedient to hold a general mechanical fair, and ordered "that an Agricultural and Horticultural Fair be held under the direction of the Board of Managers."

The managers lost no time in complying with the instructions of the Institute. Palace Garden was at once secured, a fair was announced for the 25th of September, and a circular promptly issued inviting the attention of farmers, gardeners and horticulturists of the country to the plan of the intended exhibition, and earnestly asking the co-operation of the public. The responses to the circular were prompt and encouraging, and gave flattering assurances that the plan of the fair was favorably entertained.

The fair was formally opened to the public on the evening of the 25th of September, by an address from the Hon. Henry Meigs, the Recording Secretary of the Institute.

The display of flowers and rare plants was brilliant and beautiful, the specimens of fruits were varied, extensive and attractive beyond anything the managers had contemplated. No such extensive collection of the various kinds of fruits and the different varieties of the same species were ever before brought together on this Continent. There were upwards of three thousand plates of specimens, embracing most of the kinds and varieties cultivated or raised in the northern and middle states.

In the department of flowers, the great feature of the exhibition were the Begonias, the Caladiums, the Orchids or air plants, the Ericas or ferns, the Coniferæ, and the specimens of the flowers and leaves of the Victoria Regia.

The managers were fortunate in having members of their own board capable of arranging and superintending the two departments of the exhibition with superior skill and judgment. Mr. Wm. S. Carpenter, an eminent fruit culturist, assuming the more immediate direction of that branch of the exhibition; while Mr. James Knight, an amateur, and Mr. Andrew Bridgeman, a professional florist gave direction to the floral department.

The exhibition of live fish was a novel feature in the fair, and to our co-laborer Mr. Thos. F. De Voe, whose unwearied daily

attention in keeping up the interest in this department, the managers and the public are alike indebted.

A reference to the list of premiums awarded (herewith annexed,) will disclose other features of the fair which challenged public attention, and aided in giving interest to the exhibition.

The exhibition altogether was of an elevated character, appealing to the finer tastes and cultivation of the community. The better class of citizens were attracted to it, and their appreciation was testified by unequivocal expressions of approbation and satisfaction. The Press, too, was more than usually attentive, and to the admirable notices in the city and country papers the exhibition was much indebted.

The nature of the exhibition would not admit of its being prolonged. At the very time when the public seemed most inclined to visit it, the fair had to be closed; neither fruits or flowers could be kept longer than two weeks in any kind of suitable preservation for exhibition purposes. And what was quite beyond the control of the managers, and peculiarly unfortunate, more than half of the short period allotted for the exhibition was cold, rainy and inclement weather, and the fair consequently resulted in a pecuniary loss.

Addresses were delivered during the Fair by Theodore Tilton, Esq., and by Professor Cyrus Mason.

The Anniversary Address under the direction of the Board of Trustees, was delivered by Wm. H. Anthon, Esq., at the Palace Garden, on the evening of October the 6th, and formed the closing exercises of the Fair.

The premium committee, of which Mr. George Timpson was Chairman, reported that the following premiums had been awarded:

36 pieces of silver plate, value	$613 00
1 gold medal	13 00
2 large silver medals	13 00
55 silver medals	233 75
37 bronze medals	74 00
34 diplomas	13 60
2 certificates	80
Cash	21 00
	$982 15

The following is a condensed statement of the receipts and expenditures of the 32d Annual Fair, from the report of the finance committee, of whom Mr. George Peyton was Chairman:

RECEIPTS.

Cash received from sales of tickets at Palace Garden:

Monday, September 24	$36 00		
Tuesday, " 25	92 00		
Wednesday, " 26	161 00		
Thursday, " 27	117 00		
Friday, " 28	237 00		
Saturday " 29	248 00		
Monday, October 1	47 00		
Tuesday, " 2	263 04		
Wednesday, " 3	235 00		
Thursday, " 4	184 00		
Friday, " 5	236 00		
Saturday, " 6	268 83		
		$2,124 87	
Sales of lumber	$35 00		
Sales of evergreens	5 00		
Sales of tanks	18 00		
		58 00	
		$2,182 87	
Treasurer of the American Institute, per resolution, Sept. 6, 1860		500 00	
			$2,682 87

EXPENDITURES.

By Committee on ocation.		
Rent of palace garden	$900 00	
By Finance Committee.		
Ticket sellers	55 50	
By Ticket Committee.		
Ticket receivers, &c	50 65	
By Police Committee.		
Superintendent, floor clerks, night watch and library	326 74	
Carried forward,	$1,332 89	$2,682 87

Brought forward,		$1,332 89	$2,682 87
By Printing and Publication Committee.			
Printing, porters, tickets, &c.	$110 93		
Advertising	57 73		
Bill posting	13 00		
Postage, stamps, and delivering tickets	31 34		
Stationery	14 81		
Badges	12 59		
		240 40	
By Music Committee.			
Music during the exhibition		459 00	
By Committee on Aquaria.			
Tanks	$60 75		
Salt water for do	59 00		
		119 75	
By Committee on Carpenter's Work.			
Carpenters and laborers	$37 81		
Hardware	7 44		
		45 25	
By Committee on the Reception of Goods.			
Evergreens, gravel and use of crockery	$83 50		
Muslin for covering tables	59 40		
Clerk's hire	36 00		
Freight and sundries	65 39		
		244 29	
By Committee on Light.			
Gas fitting	$36 22		
Gas, extra	32 41		
		68 63	
By Committee on Flags, Freight, &c.			
Cartage	$8 50		
Express charges	7 50		
Flag poles for stages	1 75		
		17 75	
By Committee on Refreshments.			
Refreshments for judges and managers		68 68	
By Premium Committee.			
(Total amount awarded, $982 80.)			
Cash in place of plate and medals		85 00	
			2,681 64
Leaving a balance in the hands of the managers			$1 23

The following amounts are still due:

Lumber		$93 86
Tanks for fish		38 40
Printing and advertising		196 81
Repairs of tank		38 45
Sundry expenses		5 39
		$372 91
Balance of premiums		897 15
		$1,270 06
From which deduct appropriation to be received from the State	$950 00	
Balance on hand, as above	1 23	
		951 23
Leaving a balance of		$318 83
Which added to the $500 received from the Treasurer of the Institute, shows a balance against the fair of		$818 83

Respectfully submitted.

JAMES C. BALDWIN,
WM. EBBITT,
THOMAS F. DE VOE,
WM. H. BUTLER,
JOHN V. BROWER,
THOMAS W. FIELD,
GEORGE TIMPSON,
JOHN JOHNSON,
THOMAS WILLIAMS, Jr.,
WM. H. SLOCUM,
JOHN W. AVERY,
EDWIN SMITH,
JOHN B. PECK,
T. F. ENGELBRECHT,
WM. D. ANDREWS,
CYRUS MASON,
ANDREW BRIDGEMAN,
WM. S. CARPENTER,
ISAAC M. PHYFE,
O. CLEAVELAND,
GEO. PEYTON,
HARVEY HART,
JAMES Y. WATKINS,
JAMES KNIGHT,
THOMAS McELRATH, *ex-officio*,

Managers.

New York, *January* 2, 1861.

LIST OF PREMIUMS

AWARDED AT THE AGRICULTURAL AND HORTICULTURAL EXHIBITION OF THE AMERICAN INSTITUTE, 1860.

Fruit.

Judges.—Chas. Downing, Wm. Reid, Gabriel Marc.

Hovey & Co., Boston, Mass., for the best collection of named fruit. Silver plate, $50.

Ellwanger & Barry, Rochester, N. Y., for the second best collection of fruit. Silver plate, $20.

Discretionary.

Wm. L. Ferris, Throgs Neck, Westchester co., N. Y., for a collection of fruit. Silver Medal.

A. Saul, Newburgh, N. Y., for a collection of fruit. Silver Medal.

C. E. Lilienthal, Yonkers, N. Y., for a collection of fruit. Silver Medal.

Apples.

Smith & Hanchett, Syracuse, N. Y., for the best collection of forty named varieties of apples. Silver plate, $20.

Isaac Hicks, Westbury, L. I., for the second best collection of forty named varieties of apples. Silver plate, $8.

Smith & Hanchett, Syracuse, N. Y., for the best twelve named varieties of table apples. Silver plate, $8.

J. M. Ward, Newark, N. J., for the second best twelve named varieties of table apples. Silver Medal.

Joseph Parker, West Rupert, Vt., for the best six named varieties of table apples. Silver medal.

Francis Brill, Newark, N. J., for the best twelve table apples. Bronze medal.

Pears.

Smith & Hanchett, Syracuse, N. Y., for the best collection of fifty named varieties of pears. Silver plate, $30.

Hovey & Co., Boston, Mass., for the second best collection of fifty named varieties of pears. Silver plate, $15.

J. M. Ward, Newark, N. J., for twelve named varieties of pears. Silver plate, $8.

Smith & Hanchett, Syracuse, N. Y., for twelve named varieties of pears. Silver plate, $8.

Edwin Hoyt, Astoria, N. Y., for the best six named varieties of pears. Silver medal.

Isaac Buchanan, Astoria, L. I. for the second best six named varieties of pears. Bronze medal.

P. T. Quinn, Supt. for James J. Mapes, Newark, N. J., for the best twelve table pears. Bronze medal.

Cranberries.

A. P. Woodward, South Franklin, Mass., for the best peck of cultivated cranberries. Bronze medal.

Native Grapes.

Wm. Brooksbank, Hudson, N. Y., for the best collection of native grapes. Silver plate, $25.

Isaac Merritt, Hart's village, Dutchess county, N. Y., for the best four named varieties of native grapes. Silver plate, $8.

Rufus R. Skeel, Newburgh, N. Y., for the best six bunches of native grapes. Silver medal.

Henry Ball, Newburgh, N. Y., for the second best six bunches of native grapes. Bronze medal.

Discretionary.

Rufus R. Skeel, Newburgh, N. Y., for the best four bunches of Union Village grapes. Diploma.

Chas. Downing, Newburgh, N. Y., for six bunches of fine Delaware grapes. Diploma.

Wm. Perry & Son, Bridgeport, Conn., for fine specimens of Concord grapes. Diploma.

Edward Richards, Mott Haven, N. Y., for fine specimens of Catawba grapes. Diploma.

Isaac Merritt, Hart's village, Dutchess county, N. Y., for fine specimens of Isabella grapes. Diploma.

Joseph Bartlett, Washington, Dutchess county, N. Y., for fine specimens of Isabella grapes. Diploma.

Wm. Perry & Son, Bridgeport, Conn., for Delaware grapes. Diploma.

Foreign Grapes.

Morgan G. Colt, Paterson, N. J., John Scanlon, gardener, for the best collection of foreign grapes. Silver plate, $25.

Discretionary.

James Wiggins, gardener to James Brown, Weehawken, N. J., for fine specimens foreign grapes. Silver medal.

Melons.

Francis Brill, Newark, N. J., for the best two named musk-melons. Bronze medal.

Discretionary.

Mrs. Geo. H. Hite, Morrisania, N. Y., for fine specimens of dried currants, one and two years old. Diploma.

PLANTS AND FLOWERS.

First Series—September 24th, 1860.

Judges—Robert Reid, J. E. Rauch, James Weir.

Plants in pots.

Isaac Buchanan, 9 West 17th street, N. Y., for the best collection of miscellaneous plants of house culture. Silver plate, $25.

Louis Menand, Albany, N. Y., for the second best collection of miscellaneous plants of house culture. Silver plate, $10.

Louis Menand, Albany, N. Y., for the best four specimens of plants in bloom. Silver plate, $10.

Geo. Hamlyn, gardener to Wm. C. Langley, Bay Ridge, L. I., for the second best four specimens of plants in bloom. Silver medal.

Louis Menand, Albany, N. Y., for the best single specimen plant in bloom. Silver medal.

Isaac Buchanan, 9 West 17th street, New York, for the second best single specimen plant in bloom. Bronze medal.

Louis Menand, Albany, N. Y., for the best six varieties of variegated leaved plants. Silver plate, $8.

George Hamlyn, gardener to Wm. C. Langley, Bay Ridge, L. I., for the second best six varieties of variegated leaved plants. Silver medal.

Isaac Buchanan, 9 West 17th street, N. Y., for the best collection of ferns and lycopodiums. Silver plate, $10.

Louis Menand, Albany, N. Y., for the second best collection of ferns and lycopodiums. Silver medal.

R. L. Stuart, 154 5th Avenue, N. Y., W. J. Davidson, gardener, for the best plant of thea viridis (green tea). Large silv. medal.

R. L. Stuart, 154 5th Avenue, N. Y., W. J. Davidson, gardener,

for the best plant of the coffee, or Arabian coffee. Silver medal.

Louis Menand, Albany, N. Y., for the best plant of gossypium, (cotton.) Silver medal.

James Knight, 97 2d Avenue, N. Y., for the best plant of the cinnamomum verum, or cinnamon. Silver medal.

James Knight, 97 2d Avenue, N. Y., for the best plant of the caryophyllus aromaticus, or clove. Silver medal.

Isaac Buchanan, 9 West 17th street, N. Y., for the best plant of the myristica moschata, or nutmeg. Silver medal.

Orchids.

Isaac Buchanan, 9 West 17th street, N. Y., for the best show of orchids in bloom. Silver plate, $20.

James Knight, 97 2d Avenue, N. Y., for the best single orchid in bloom. Silver medal.

Isaac Buchanan, 9 West 17th street, N. Y., for the second best single orchid in bloom. Bronze medal.

Cut flowers.

Dailledouze & Zeller, Delmonico Place, Brooklyn, L. I., for the best display of roses. Silver medal.

Mateo Donadi, Astoria, L. I., for the second best display of roses. Bronze medal.

Dailledouze & Zeller, Delmonico Place, Brooklyn, L. I., for the best 12 varieties of roses. Bronze medal.

Charles S. Pell, N. Y. Orphan Asylum, 74th st. and Broadway, for the best display of dahlias. Silver plate, $15.

Mateo Donadi, Astoria, L. I., for the second best display of dahlias. Silver medal.

Mateo Donadi, Astoria, L. I., for the best twelve named varieties of dahlias. Silver medal.

Peter Brunner, Llewellyn Park, Orange, N. J., for the second best twelve named varieties of dahlias. Bronze medal.

Peter Henderson, Jersey City, N. J,, for the best collection of verbenas, named varieties. Silver medal.

J. W. Faulkner, Stamford, Conn., for the second best collection of verbenas, named varieties. Bronze medal.

Isaac Buchanan, 9 W. 17th st., N. Y., for the best collection of petunias. Silver medal.

Discretionary.

Charles S. Pell, N. Y. Orphan Asylum, N. Y., for a collection of cut flowers. $5.

Wm. Mitchell, Harlem, N. Y., for a collection of cut flowers. $3.

Joseph Wakeling, Woodstock, Morrisania, for a collection of cut flowers. $2.

Hovey & Co., Boston, Mass., for cut flowers and dahlias. Silver medal.

John Wilson, Albany, N. Y., for a seedling petunia, "Garibaldi." $1.

James Knight, 97 2d Av., for a Wardian case with plants. $10.

Floral Designs.

Wm. Fitzpatrick, c. Broadway and 29th st., for the best floral design. Silver plate, $25.

Peter Brunner, Llewellyn Park, Orange, N. J., for the second best floral design. Silver plate, $10.

Discretionary.

Benjamin Wood, Manhassit, L. I., for a floral design. Silver medal.

Baskets and Bouquets.

B. Hanft & Brother, 683 Broadway, for the best basket of flowers. Silver plate, $10.

Wm. Reid, 22 W. 30th st., for the second best basket of flowers. Silver medal.

Wm. C. Wilson, 43 W. 14th st., for the best table bouquet. Silver medal.

Daniel Wilson, 43 W. 14th st., for the best pair of hand bouquets. Silver medal.

John Cranstoun, Hoboken, N. J., for the second best pair of hand bouquets. Bronze medal.

Evergreens.

Louis Menand, Albany, N. Y., for the best collection of evergreens. Silver medal.

Discretionary.

D. Higgins, Flushing, L. I., for evergreens. Bronze medal.

Second Series—Oct. 1, 1860.

HOUSE PLANTS.

Discretionary.

Isaac Buchanan, 9 W. 17th st., for a beautiful collection of house plants. Silver plate, $25.

Louis Menand, Albany, N. Y., for a beautiful collection of house plants. Silver plate, $25.

Geo. Hamlyn, gardener to W. C. Langley, Bay Ridge, L. I., for a collection of house plants. Silver plate, $5.

CUT FLOWERS.

Judges—W. J. Davidson, Timothy Ryan, Robt. Reid.

David Clark, 77th st. and Broadway, for the best general display of cut flowers. Silver plate, $15.

Chas. S. Pell, N. Y. Orphan Asylum, 74th st. and Broadway, for the second best general display of cut flowers. Silver medal.

Dailledouze & Zeller, Delmonico Place, Brooklyn, L. I., for the best display of roses. Silver medal.

Dailledouze & Zeller, Delmonico Place, Brooklyn, L. I., for the best 12 varieties of roses. Bronze medal.

Chas. S. Pell, N. Y. Orphan Asylum, 74th st. and Broadway, for the best display of dahlias. Silver plate, $15.

David Clark, 77th st. and Broadway, for the second best display of dahlias. Silver medal.

Andrew Richardson, Fordham, N. Y., for the best 12 named varieties of dahlias. Silver medal.

P. Brunner, Llewllyn Park, Orange, N. J., for the second best 12 named varieties of dahlias. Bronze medal.

Peter Henderson, Jersey City, N. J., for the best collection of verbenas, named varieties. Silver medal.

J. W. Faulkner, Stamford, Conn., for the second best collection of verbenas, named varieties. Bronze medal.

Floral Designs.

Wm. Fitzpatrick, c. Broadway and 29th sts., for the best floral design. Silver plate, $25.

P. Brunner, Llewellyn Park, Orange, N. J., for the second best floral design. Silver plate, $10.

Plants in Pots.

Mateo Donadi, Astoria, L. I., for the best collection of named varieties of carnation pinks in pots. Silver medal.

Dailledouze & Zeller, Delmonico Place, Brooklyn, for the second best collection of named varieties of carnation pinks in pots. Diploma.

Baskets and Bouquets—Discretionary.

Robert Reid, jr., 22 W. 30th street, for the best pair of hand bouquets. Bronze medal.

P. H. Nugent, South Bergen, N. J., for the second best pair of hand bouquets. Diploma.

W. H. Cavinach, Brooklyn, L. I., for the best parlor or table bouquets. Bronze medal.

B. Hanft & Brother, 683 Broadway, for the second best parlor or table bouquets. Diploma.

B. Hanft & Brother, 683 Broadway, for the best basket of flowers. Silver medal.

Vegetables.

Judges.—Richard E. Keeler, Benj. S. Haviland, Wm. H. Sackett.

Anthony Brill, Newark, N. J., for the best collection of vegetables. Silver plate, $25.

Samuel Ruth, Blackwell's Island, for the best 12 blood beets. Bronze medal.

Anthony Brill, Newark, N. J., for the best 12 carrots. Bronze medal.

Samuel Ruth, Blackwell's Island, for the best twelve parsnips. Bronze medal.

John Egan, Staten Island, for the best twelve salsify. Bronze medal.

John L. Nostrand, Brooklyn, L. I., for the best two egg plants. Bronze medal.

N. P. Anderson, Almshouse, Blackwell's Island, for the best half peck of tomatoes. Bronze medal.

Samuel Ruth, Blackwell's Island, for the best half peck of Lima beans. Bronze medal.

Samuel Ruth, Blackwell's Island, for the best six heads of cabbage. Bronze medal.

Anthony Brill, Newark, N. J., for the best six heads of celery. Bronze medal.

P. T. Quinn, Supt. Jas. J. Mapes, Newark, N. J., for the best twelve ears of table corn. Bronze medal.

Samuel Ruth, Blackwell's Island, for the best collection of squashes. Silver medal.

A. B. Winant, Little Ferry, Bergen, N. J., for the largest pumpkins. Bronze medal.

Aquatic Plants.

John Pollock, gardener to James Dundas, Philadelphia, Pa., for splendid specimens of the leaves of the Victoria Regia and its flowers. Large silver medal.

Fish.

Judges.—John W. Hawkes, Justus D. Hiscox, Peter Vincellette.

Samuel B. Miller, Fulton Market, N. Y., for the best collection of live salt-water fish. Silver plate, $25, and certificate.

Charles Miller, Fulton Market, N. Y., for the second best collection of live salt-water fish. Silver plate, $10, and certificate.

Insectivorous Birds.

John G. Bell, 339 Broadway, for the best collection of prepared insectivorous birds, properly named. Silver medal.

Native Wine.

Judges.—James M. Sanderson, John Travers.

Frederick S. Cozzens, 73 Warren street, for the best native wine from the grape, (sparkling Catawba.) Gold medal.

Frederick S. Cozzens, 73 Warren street, for the second best native wine from the grape, (dry Catawba.) Silver medal.

J. W. Faulkner, Stamford, Conn., for the best bottle of currant wine. Bronze medal.

I. M. Ward, Newark, N. J., for the best bottle of strawberry wine. Bronze medal.

Discretionary.

William Perry & Son, Bridgeport, Conn., for Concord grape wine. Diploma.

Alfred Speer, Passaic, N. J., for elderberry wine, possessing a high standard of excellence. Diploma.

Dairy Productions.

Judges.—Wm. S. Badeau, Aaron Carpenter, J. D. Hunter.

Geo. B. Drake, Sussex county, N. J., for the best butter. Silver medal.

PRESERVED MEATS, FRUITS, VEGETABLES, MILK, ETC.

Judges—Charles A. Seely, James R. Smith.

A. Kemp, 116 Wall street, for the best assortment of preserved fruits and vegetables, game and fish. Silver plate, $10.

Aaron N. Thompson & Co., 221 and 223 Fulton street, for the second best preserved vegetables. Diploma.

Vegetable Preservative Company, 327 West Twentieth street, for the best desiccated meats, fish, fruits, and vegetables. Silver medal.

American Solidified Milk Company, 73 Liberty street, for the best solidified milk. Diploma.

Discretionary.

J. S. & J. D. Stout, 185 Reade street, for superior specimens of Trenton water crackers. Diploma.

FLOUR, ETC.

Judges—Paul Worth, J. H. Herrick, Henry W. Smith.

Hecker & Brother, 201 Cherry street, for the best barrel of wheat flower. Diploma.

Hecker & Brother, 201 Cherry street, for the best barrel of self-raising flour. Diploma.

Discretionary.

Mack & Talcott, 261 Washington street, for oatmeal, oat groats, and pearl barley. Diploma.

AGRICULTURAL AND HORTICULTURAL IMPLEMENTS.

Judges—Sam'l L. Shotwell, Jno. A. Schenck, Jno. G. Bergen.

Early, Taylor & Parvin, Hightstown, N. J., for a potato-digger, a valuable labor-saving machine. Diploma.

John Jones & Co., 31 Fulton street, for a corn-sheller, for its simplicity, evident durability, and practicability. Silver medal.

R. L. Allen & Co., 189 and 191 Water street, for an improved two-wheel mower. Silver medal.

G. H. Moore, Rochester, N. Y., for a straight-line plow, well constructed. Silver medal.

R. L. Allen & Co., 189 and 191 Water street, for a fruit ladder. Diploma.

Henry Steele, Jersey City, N. J., for a bee protector. Diploma.

Patent Package Company, Newark, N. J., for patent packages for seeds, &c. Diploma.

Jesse K. Park, Marlboro,' Ulster county, N. Y., for patent berry baskets. Diploma.

William D. Grimshaw, 494 Broadway, for a self-acting ventilator for greenhouses. Diploma.

The American Hydropult Company, 41 Park Row, for the patent hydropult. Diploma.

[This effective invention was the means of saving the Palace Garden Hall from destruction by fire, during the Thirty-second annual fair of the American Institute, on the evening of the 5th of October, 1860.]

POULTRY.

Judges—Daniel Fowler, D. Tilton, Joseph T. Hedden.

Wm. Simpson, jr., West Farms, N. Y., for the best and largest collection of domestic fowls. Silver plate, $15.

H. Johnson, Paterson, N. J., for the best three black Spanish fowls. Silver medal.

Joseph Wakeling, Woodstock, Morrisania, N. Y., for the second best three black Spanish fowls. Diploma.

Louis Haight, Westchester, N. Y., for the best three Chittigongs. Silver medal.

Wm. Simpson, jr., West Farms, N. Y., for the best three game fowls. Silver medal.

Joshua Weaver, Fordham, N. Y., for the best three Dorkings. Silver medal.

Wm. Simpson, jr., West Farms, N. Y., for the best three black Poland top-knots. Silver medal.

H. Johnson, Paterson, N. J., for the best collection of bantams. Silver medal.

Discretionary.

Martin R. Beam, 104th street and 3d avenue, N. Y., for the best Brahma Pootras. Diploma.

H. Hales, Fort Washington, N. Y., for the best golden Seabrights. Diploma.

Ducks.

Wm. Simpson, jr., West Farms, N. Y., for the best three Aylesbury ducks. Silver medal.

Martin R. Beam, 104th st. and 3d avenue, N. Y., for the second best three Aylesbury ducks. Diploma.

Wm. Simpson, jr., West Farms, N. Y., for the best three black Java ducks. Silver medal.

Wm. Simpson, jr., West Farms, N. Y., for the best three Poland ducks. Silver medal.

Discretionary.

Joshua Weaver, Fordham, N. Y., for three very fine Rouen ducks. Diploma.

Wm. Simpson, jr., West Farms, N. Y., for a very fine wood duck. Diploma.

Geese.

Martin R. Beam, 104th street and 3d avenue, N. Y., for the best three wild geese. Silver medal.

Martin R. Beam, 104th street and 3d avenue, N. Y., for the best pair Poland geese. Bronze medal.

Wm. Simpson, jr., West Farms, N. Y., for the best pair Chinese geese. Bronze medal.

Wm. Simpson, jr., West Farms, N. Y., for the best pair native geese. Bronze medal.

Discretionary.

Martin R. Beam, 104th street and 3d avenue, N. Y., for the best pair of white swan geese. Diploma.

Turkeys.

H. Johnson, Paterson, N. J., for the best white turkeys. Silver medal.

Pigeons.

H. Johnson, Paterson, N. J., for the best collection of fancy pigeons. Silver plate, $10.

Wm. P. Miller & J. L. Palmer, New York, for a very good collection of pigeons. Bronze medal.

DRAWINGS.

Discretionary.

A. Hochstein, 210 Spring street, for drawings of agricultural subjects. Bronze medal.

Miss Jane E. Dodge, for water color drawings of plants. Diploma.

Special Premium.

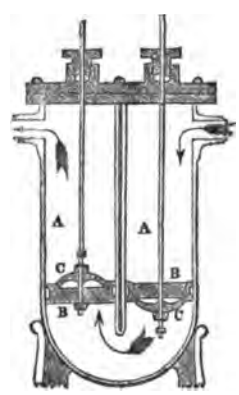
Henry S. Olcott, of the New York Tribune, for his Reports of the Thirty-second annual fair at Palace Garden. Silver cup.

THE HYDROPULT,

An invention for throwing water by hand power.

PATENTED BY W. T. VOSE.

THE HYDROPULT IN USE.



SECTIONAL VIEW.

EXPLANATION OF THE SECTIONAL VIEW.—A A shows the two parallel cylinders. B B the boxes. C C the valves. The arrows, the direction of the water.

At the late fair of the Institute, at Palace Garden, in lighting the gas for the evening, fire was communicated to some light,

combustible ornaments, and the flames quickly communicated to the canvas and board ceiling of the roof. The roof was so high, that there were no means of reaching the fire by ladders, or otherwise, and one of your hydropults being on exhibition, it occurred to one of the floor clerks of the exhibition to bring it into use.

With a single pail of water, and this little instrument, the fire was almost instantly extinguished. It was the general impression that three or four minutes' delay would have resulted in the certain destruction of the building, and all present concurred in the opinion—or rather in the certain conviction—that the Hydropult saved the Institute from a similar calamity which, on the same day of the month, two years before, laid the Crystal Palace in ashes.

Price $12. American Hydropult Company, 151 Nassau street, New York.

HORTICULTURAL SHOW

OF THE AMERICAN INSTITUTE, AT PALACE GARDEN.

BY HENRY S. OLCOTT.

OPENING OF THE FAIR—GENERAL VIEW.

The fair was opened in due form on Monday evening by an address from Judge Meigs, which took in general review the history of the Institute, and contained copious personal reminiscences of the progress of American agriculture. All through the day and evening fresh contributions of fruits and flowers were received by express and private conveyance, and not a few, who were so unfortunate as to be disappointed in the receipt of their specimens bewailed their ill fortune at being excluded from competition. On Monday we saw the halls in a state of chaos, many tables were unfilled, some uncovered, and some overcrowded with specimens hastily grouped together. Tuesday, however, we found on entering the Palace garden that order had taken the place of confusion, and the full merit of the show was made more apparent.

During the twenty-four hours which had elapsed the long lines of fruit plates and flower tables had been filled, and the superintendents were at a loss to know where to find the space which new exhibiters clamorously demand. Hovey & Co., of Boston, have contributed a lot of 30 varieties of dahlias, and Andrew Bridgeman, a collection of ten pots, in each of which is a specimen plant, which would have taken a premium if brought here before the closing of the entry books. The best plant of this collection, perhaps, is the *Madame Alvord* begonia, and, after that, the most noticeable the *Dioscorea discolor*, whose heart-shaped leaves, with their green faces and purple backs, will attract the attention of the flower amateur. This plant is of the same species as the Chinese yam, or *batatas*, on which Prince attempted to create ye grande sensation, a couple of years ago.

Near the water-basin in the main hall is a huge yam, from Nicaragua, in shape like an elephant's foot, and in weight almost as heavy, we fancy, if let fall upon one's toes from a proper elevation. This yam, which rejoices in the fearful name *Testadunaria Mexicana*, is a regular article of Nicaraguan diet, it being cut up into "chunks" for boiling. No doubt of Walker's returned fillibusters in this city will certify to its esculent properties.

Mr. Isaac Buchanan, the florist, has a most excellent friend in a Capt. J. M. Dow, who trades between this metropolis and the fertile shores of Nicaragua. The captain is a veritable enthusiast in the manner of collecting strange vegetation, a real curiosity hunter in the domains of Flora and Ceres; and there is no tree too high, no morass too spongy, and no cactus hedge too prickly to check his ardent search of rarities. To him is the Institute indebted for the great slab-footed yam; to him for the thirty or more orchids which hang over the lily-basin, and grow on air alone; to him the specimen of Spanish moss, *Tillandsia usenoides*, which droops its long pendants of linked leaves from the bit of wood on which it grew in Central America. Pity we did not have more Capt. Dows. Mr. Buchanan tells us that this immense yam belongs to the Diascorea family, and only produces a small running vine, which is very remarkable, considering the large mass of vegetable matter which it contains in its tube. This is supposed to be the first plant of the species brought to this country in the living state.

One of Capt. Dow's orchids is a monster specimen of its kind, the *Stanhopea*—having a mass of roots two feet in diameter, and weighing about seventy-five pounds. Since our report yesterday, Wm. Perry & Son, of Bridgeport, Conn., having entered a lot of French asters, numbering over thirty varieties in all; some of them are superior plants.

The doors of Palace garden were thrown open on Tuesday morning, the public were admitted to a horticultural show which promises to equal, if not excel any display of the kind ever made in this country.

Whether it be attributable to a change in the board of management, and the consequent infusion of enterprise and public spirit, or not, we leave others to decide; but certainly the show of flowers and fruits, which has already been made, betoken a radical improvement in the guidance of the Institute, and augurs

a pecuniary success. The long halls and winding walks of the Palace garden, which last year were obstructed and cluttered up with a confused display of implement, machines, manufactured goods, garden products, and objects of taste and art, are this year entirely devoted to the attractive, useful, and beautiful products of the field, garden, orchard, and hot-house, and there is every probability of our having at last a show worthy of the environs of London. The great halls are so lighted and shaped as to afford every facility for a charming display of flowers, shrubs, and fruits; and the mingled bright tints of the flowers, seen with the appropriate background of coniferæ, and deciduous shrubs, are made more beautiful and acquire new charms.

Entering the main hall, the eye takes in at once the picture of a long, high-roofed room, with long tables running through its whole length covered with cut flowers and potted plants; in the centre of the room a very large tank filled with water, over which orchids, or air plants are hung from wooden arms; another basin into which a number of jets of water are constantly splashing in graceful curves; and, away back at the end of the room a raised platform filled with shrubs and plants in pots. The principal exhibiters in this room are Isaac Buchanan, who shows a monster collection of green-house and hot-house plants, in all over two hundred specimens, Louis Menand, of Albany, who also has a splendid assortment of these plants, George Hamlyn, gardener to Mr. Langley, of South Brooklyn, and Dr. James Knight, of this city, who superintends this department of the show. Dr. Knight has in his large Wardian case a remarkable specimen of the *Anoectochylus setaceus* whose green velvety leaves with their ribs, veins, and borders of golden silk, are among the rarest productions of vegetable life. This variety of the *anoectochylus* cannot be bought in London short of a pound sterling the plant. Dr. Knight also shows a fine-thrifty cinnamon tree which he imported last year from Java. It is a mere shrub yet, but if it grows as rapidly as it has during the past twelvemonths, it will be large enough by and by. The cinnamon must be five years old before the bark is fit to be stripped off, dried, and used as spice. Mr. Buchanan exhibits a small nutmeg plant, which is probably the only one of the kind in this country. Mr. Menand's collection of coniferæ is deserving of general notice, both for the number of varieties, and the health and compactness of the specimens. Buchanan has some orchids, placed in

moss in pots, probably from a desire to save them; among which no one will fail to notice the rare specimen of *oncidium Carthagenensis*, and *epidendrum vitellinum*, the latter, the smaller of of the two, but remarkable for the color of its flowers.

The tank in the center of this hall is intended for two extraordinary specimens of the *Victoria Regia* or gigantic American lily, of which the leaves are *twenty-one feet* in circumference and the flower a foot in diameter. One of these is the original plant imported by Mr. Caleb Cope a dozen years ago, and is exhibited by Mr. Stuart, of Philadelphia. The other, shown by Mr. James Dundas, another gentleman from Philadelphia, and from this lily is expected a mammoth flower, which will burst and exhibit its glories on the 29th inst. (Saturday). It may be well to remark that the unfolding of the flower is always accompanied by the putting forth of a new leaf, which having been previously folded up in a most curious manner opens to its full extent as the flower fades and goes. There are specimens of this Victoria—this queen of all the lilies, this royal plant, whose rose-tinted double flowers array her in more glory than even a Solomon—in the basins of the Crystal Palace at Sydenham, each of whose tray-shaped leaves would make a raft for a child.

From the first hall to the second the visitor passes along a canvas-roofed gallery, at the side of which are the tables of vegetables, and in the center the two tanks in which the salt-water fish disport themselves. In these miniature seas the lazy-motioned turtle plods along the bottom, while above him dart the nimble fish. In one tank is shown a sturgeon seven feet in length, ugly enough and long enough to frighten obstreperous children into docility. Contributions of vegetables are to be made from the gardens of several noted cultivators, but up to noon yesterday only Samuel Ruth's seventy kinds of vegetables were exposed to view.

The fruit show promises to be, without exception, one of the best ever made in this country. There will be over three thousand platefuls on the tables, of which two exhibiters alone will contribute 1,000. Ellwanger & Barry, of Rochester, N. Y., have engaged space for 500 plates, and Smith & Hanchett, of Syracuse, an equal number. A. Saul has 200 plates; W. S. Carpenter (superintendent of this department), 150 plates; Dr. Ward, of Newark, 35 plates; John Brill, 50 plates; Isaac Hicks, 70 varieties of apples; Hovey & Co., of Boston, 200 plates; Prof. Mapes,

50 varieties of pears; and Col. Marshall P. Wilder, of Boston, is expected here with a large contribution from his famous pear orchard.

The great anxiety of each visitor Tuesday morning was to know if the great lily had arrived. It came safely to hand, or rather some of its leaves did at about 3 o'clock, in the midst of the famous rain shower, and to the accompaniment of thunder and lightning. It was contained in a huge thin square box, and carefully packed in new-mown grass, suitably moistened. The box was carried to the water basin by four men, carefully opened, and then, when the crowd pressed thickly about, some wag asked his neighbor if he saw anything green. We should think he did, for each of the monster leaves must measure six feet across, to say nothing of the edge which is turned up. The leaf is smooth and green on the upper side, but purple, very thorny, and divided into compartments by the thick veins and ribs, like the drawer of a dry-goods merchant. The thorns and leaves and stem are very sharp and strong, and about three-fourths of an inch long. The gardener who raised these leaves says that each one will bear a weight of one hundred pounds if it be evenly distributed all over the surface. It is of a tough leathery texture, and might serve as a float for a stout boy. The box being opened the grass was brushed from the leaves, and then by the assistance of several men, the huge things were carefully inverted and placed in their watery abiding-place, where they float in their majesty, amid the sylvan court about them, veritable giants among pigmy leaves of ordinary plants.

In the salt water aquarium of the fair, there is to be seen one of the regular game fish of New York sportsmen, known as the sheepshead. It is one of the most beautiful of salt water fish, and to catch one is considered an exploit of importance, even by our most experienced amateur, Isaac Waltons. We believe that a fish of this species has never before been exhibited in this city, and the opportunity which is offered of seeing it sporting in its native element, will, no doubt, be embraced by hundreds.

NATIVE AND FOREIGN GRAPES.

The force of habit is such that when the public becomes accustomed to one thing, and is taught to regard it as good, it is sometimes a hard task to convince it that there are better things of the kind in existence. This dogmatic adherence to custom is

carried, in England, to far greater lengths than in this country; and nowhere does the inventor find it more difficult to introduce and popularize his novelty. For many years we have cultivated the Isabella and Catawba grapes, natives of the United States; by degrees they have been introduced into every State and Territory, and not only may they be seen climbing the porch and roofing the arbor of the lowly cottage, but an immense amount of capital and skill is devoted to their culture, and the manufacture of their wines. About the city of Cincinnati, thousands of acres of hill-side are planted in vineyard, and much of the wealth and prosperity of that city may be fairly attributed to the development of this branch of rural industry. Thus a conviction has gradually grown in the public mind that the Isabella and Catawba are *par excellence* the only good American grape; and of the many thousands who will read this paragraph, or go and see the specimens of which we purpose to speak, the great majority will be surprised to learn that there are new kinds which bid fair to run their favorites from the market.

Vineyardists recognize two kinds of grapes, which are as separate and distinct in their properties and value as can well be imagined. There is one family whose sweet and luscious fruit is fit only for the table; while the other, whose juice may be said to possess a high degree of acidity overcome with a higher degree of sugar and agreeably flavored with aromatics, is the true wine-grape of the world. The former, of which the sweet-juiced *Chasselas de Fontainebleau* is a type, is termed "feeble flavored;" while the latter, represented by the Catawba, Diana, Isabella, and a host of others is designated as "vinous" and "sprightly." The juice of the Sweetwater, a foreign grape of the Chasselas family, is described in the very name of the variety, and is nothing but sugar and water, with some mucilage added, and soon palls upon the taste of the eater. Let any one who wishes to see the best collection of American seedling grapes ever grown in this city go to the Horticultural show at Palace Garden, and be convinced of the truth of what we say. There, in close juxtaposition, they will see Isabellas and Catawbas, and a score of other varieties, a mere handful, it is true, of the hundreds which are known to nurserymen, but still embracing all or nearly all the kinds recommended for general cultivation. Next to the Isabellas and Catawbas lie some bunches of the Northern Muscadine, a foxy or rank-flavored variety, which hardly ever ripens whole bunches,

but separate berries which drop as they ripen. It has little to recommend it in flavor to the delicate palate of the connoisseur whose taste has been educated amid better things, but it may do well enough for stewing into "sass" for supper-tables in the rural districts. In close proximity are several dishes of the Delaware, a grape which, after years of opposition and unfair treatment, has been placed at the head of the list. Of late years, wherever it has come in competition with other varieties, it has received the premium, and a new triumph has been reaped for it at this splendid show. There are over twenty varieties of native grapes on the tables, and among them all the judges were to award a prize for "the best dish of native grapes, one variety; not less than six bunches." When we state that Charles Downing and William Reid were members of that committee, it will be seen that the charge of incompetence can scarcely be alleged against it. These men, after trying all the kinds, gave the premium to Mr. Skeele for his dish of Delaware, although they themselves are more interested in the sale of other varieties. The Delaware has a smaller berry than the Catawba, but it is sweet to the very center, has none of the astringency of the latter, the flesh is very juicy with some consistence, and it has a pure vinous life, which is easily remarked by a stranger at first taste. It has been claimed as identical with the *Taminer* of Europe, and a party, with Nicholas Longworth at its head, has stoutly opposed its claims to nativity; but the friends of the Delaware positively assert that it was first discovered and cultivated by Mr. Thompson of Delaware, Ohio, and bring a mass of proof in support of the claim.

Next on the table we see the Diana, a red grape, originated by Mrs. Diana Crehor of Milton Hill, near Boston. This is a seedling of the Catawba, but much purer in flavor than the parent, sweeter and more vinous, and free from its astringency. Then passing some less valuable varieties, we come to a grape which the Shaker brethren at Union Village, near Cincinnati, gave to the world, through the powerful agency of Mr. Longworth, some twenty years ago. When its first fruit was exhibited at a show, it was mistaken by the committee for rare Black Hamburgs, and the first premium was given it as the best specimen of that foreign variety, grown in open air, on exhibition. The Union Village is a seedling of the Isabella, and has its peculiar color and bloom; but its size is such that it is easily mistaken for the Black

Hamburg. The demand has ever proved greater than the supply, for it not only ripens ten days earlier than the Isabella, but in Ohio a good wine has been made from it, without the addition of sugar or brandy, which cannot be said of the Isabella.

Next in order of excellence and tabular position is the Rebecca, probably a seedling from the Isabella, and originated by Mrs. E. M. Peake of Hudson. It has bunches of medium size but very compact, the color is green in the shade, but a lively amber in the sun, and its berries are covered with a fine bloom. Its flavor is sweet and luscious, it has no toughness or acidity in the center, like the majority of American grapes. The berries are very firmly attached to the bunch, and it is easily kept throughout winter in sound condition. The premium specimens here are exhibited by Wm. Brocksbank of Hudson, N. Y. Bull's "Concord" grape is not quite equal to the Isabella in flavor, but it is much hardier and earlier. It has the very excellent quality of ripening more than a degree of latitude further north than the Isabella, and hence it is fairly regarded a valuable acquisition to the family of natives. The "Hartford Prolific" was taken wild from the woods; it is earlier than the Concord, but not equal to it in flavor, and ranks much below the Isabella, hence it is generally deemed valuable only in extreme northern grape regions.

Hemmed in at either side by the displays of natives is a first-rate collection of foreign hot-house grapes, which, transported from their sunnier climes, can only be fruited in this country in the tropical atmosphere of the hot-house. Our sturdy farmers and humble mechanics have little conception of the thousands of dollars which are annually expended by wealthy American citizens in the construction and maintenance of glasshouses, merely that they may have fresh grapes for their midwinter desserts. Nor, indeed, does the Dives himself often know how many dollars per bunch his luxury has cost him, which no doubt will explain the readiness of each year's new devotees to follow in the footsteps of predecessors. Bunches of grapes weighing five or six pounds a piece seem fabulous things to talk of, but they may be seen by any one who will go ten rods from the bustle and turmoil of Sixth avenue and Fourteenth street, and step into the beautiful exhibition halls at Palace Garden. Here they will see the Black Hamburg in several varieties, which the vigneron from the banks of the Rhine will recognize as the favorite "Frankenthal," whose purple clusters he may have plucked from his cot-

tage window, or trampled in the wine-press of the neighboring seigneur. The name by which we know it is purely of English origin, and in fact the grape is as well known there as the "Hampton Court" as by its other title, for the fame of the monster vine at Hampton Court Palace has filled the whole land. That venerable vine, planted in the good old days of Queen Bess, has grown and strengthened with each of the intervening two hundred and fifty years, until it now bears 3,000 pounds of fruit at a single crop, and has a stem as large as Falstaff's body.

Next the Black Hamburg may be seen magnificent specimens of the white "Xeres" grape, from which the famous sherry wine is made, and whose long pendent, loosely branched bunches hang thick in the vineyards of Castile and La Mancha. Here, too, we may see in miniature, albeit the specimens weigh several pounds, the grapes which the spies of Moses found by the brook of Eschol, and "cut down from thence a branch with one cluster of grapes, and they bare it between two upon a staff." But we cannot say the collection of foreign grapes at the American Institute show is complete, for we miss the favorite Muscat of Alexandria, whose luscious berries when dried in the sun make the amber-colored Muscatelle raisins. To compensate in part, however, for their absence, we may examine some fine specimens of the new Trebiana, of which one of the bunches weighs at least five pounds. We presume that Prince's new found Eureka grape comes fairly in the "foreign" class, for he says it was brought by the ghost of his father from the planet Juno. One solitary unripe bunch on a dirty plate by itself, represents the heaven-born vine for which the great yam propagator is prepared to refuse a bid of $30,000. To our uninspired vision and palate it seems marvellously like the Diana, only not quite so good, and a suspicion was naturally awakened in our mind that if the assumed celestial habitat of Eureka be no lie, the chaste goddess after whom the other fine grape is named, has given it to the happy possesser through the medium of a horticultural spirit messenger with clear intent to defraud.

In regard to the merit of this great display of fruits, we say with the leading pomologists who composed the jury of award, that it is the finest ever made in this city, and equal if not superior to the grand exhibition of the National Pomological Congress recently held in Philadelphia. The pears and apples are more numerous than in any preceding show in this city, and the plums,

considering the lateness of the season, are fine. Smith & Hanchett take a number of premiums, in spite of the formidable competition of Ellwanger & Barry, whose mammoth fruit shows make a feature of every agricultural fair. In regard to this latter firm, it may be interesting to state that they have more acres of ground in nursery than any other firm in the world, André Leroy of Angers, France, not even excepted. They employ 400 men on their 600 acres, and keep 40 horses constantly at work drawing manure for their well-kept grounds.

FLOWERS AND VARIEGATED LEAF PLANTS.

Of all the luxuries in which men of wealth indulge, we know of none more pardonable than the collection of rare and beautiful plants. The cultivation of this taste, unlike that of so many others, brings no remorse, and breeds no misery nor family discord; but, while it affords a constant temporary pleasure, exercises the happiest temporary effect upon all the members of the family. The child of the wealthy citizen, accustomed from infancy to the cheerful and enobling influence of a green-house or conservatory, has a love of the beautiful, gradually developed—a love which goes far towards counteracting the malign influences of city life. The hours spent in boyish play in the warm and perfumed atmosphere of his father's plant palace, insensibly prepares the man for a happy life in a suburban residence, and the daughter, if linked to the fortunes of a poor man, gains health and happiness from a personal supervision of the little cottage garden. What the children of wealthy parents get thus freely is denied to those of humbler station, and hence the great value of great displays, like this of the American Institute, where the glories of the floral and pomological kingdoms are made visible at cheap cost to the great public. Yesterday, as we strolled along the aisles lined with rows of shrubs and plants, lingered by the tables of cut flowers, and paused at the lily basin to see the monster *Victoria* or the pendant orchids, we noticed with satisfaction the delight of poor children and their hard-working parents at seeing the beautiful things around them.

Now that the managers of the Institute have learned how great a Horticultural show may be made at the metropolis, we trust they will be induced to make it a permanent thing among us, by erecting suitable buildings and having those weekly exhibitions which have done so much toward the development of rural taste

in Boston. In and about the city there are nurserymen enough to make our horticultural shows superior to any in the country, and there is a wealth of plants and fruits in the green-houses and gardens of private citizens, which, if once systematically drawn out, would crown the effort with success. To say nothing of the large property which the Institute has already accumulated, there are plenty of wealthy men pf taste who would be quite as ready to contribute toward the accomplishment of this grand object, as they have been to send clothing to the antipodes.

The visitor to the show at Palace Garden will not fail to be struck with the beauty and variety of colored leaf plants. Especially noticeable are the specimens shown by Mr. Isaac Buchanan, the florist, and as this specialty of culture has sprung up almost entirely within five years, we presume our readers will be glad to know something of the nature and history of the plants.

Next to having a pleasing succession of fragrant or high-colored flowers, it is the object of the gardener to fill his green-house with a mass of foliage of such variety of tint and shape as to make of themselves an attractive display. One of the fundamental principles of landscape gardening, is to make a pleasing diversity in detail, subordinate to the production of a grand whole; and in fact, if once this diversity in the separate parts were lost sight of, the result would be tame and uninteresting. In forming his group of trees, therefore, the gardener of taste places round-topped trees along with those of branching or pointed tops, and thus in his apparent incongruous arrangement, he achieves a pleasing as well as a striking group. The same rule holds good in the glass-roofed garden as well as on the broad estate; and nothing more tame or uninteresting could be imagined than a green-house in which rows of plants of equal height and equal tint were multiplied *ad nauseam.* To the man whose wealth makes it possible for him to procure the rarest plants or trees of the tropics, the humble flowers which grow abundantly near home seem of small account, and it therefore happens that agents are sent at great cost, to Borneo, or other strange countries to procure the rarities their patrons need. As new countries are opened by the extension of commerce, or otherwise, and their rare vegetable productions are brought to the feet of Dives, a new furor is created for certain plants, perhaps, whose only great attraction is their cost of importation or hideous shape. Occasionally, however, a real treasury is opened, and a real bene-

fit conferred upon our nurserymen, by the discovery of plants of decided character and use. This is especially the case with the Begonia, a plant of beautiful appearance lately found in the solitudes of Bornean forests, and imported into this country, via England.

Generally speaking, the most brilliant and fragrant tropical flowers grow on large trees or shrubs, and if we desire to cultivate them in this country we must not only build very large green-houses, but also wait long for the reward of our labors. Hence the taste for variegated leaf plants, of which the tropics furnish the rarest specimens, has recently sprung up, for thin vivid colors may be enjoyed from their very beginning, and thus, in the long run, confer as much pleasure as even the fragrant but treacherous magnolia. Of the plants cultivated for their graceful leaves, the fern and mimosa are familiar types; of those which are remarkable for striking shape, the Spanish bayonet, the palm, and cactus will be remembered; and of those which recommend themselves both for color and shape, none are more notable instances than the begonia and caladium, although the former is more famous for its tints than outline.

In the tropics are found plants of the most brilliant colors, and birds of the most gorgeous plumage. While the woods are not so vocal with song as the groves of a more northern latitude, there is a magnificence in the tints of birds and flowers for the eye to feast upon, which compensate, in some part at least, for the dead stillness which reigns in the sylvan solitudes. The high colors of tropical vegetation are, no doubt, greatly due to the constant and direct influence of sunlight, which provokes and sustains a chemical action on the sap, and the formation of acid is followed at once by the production of a high color. Not even these wild regions are unvisited by the agents of Veitch and Low, the great London nurserymen, or by those numerous messengers which the managers of the Kew botanical gardens keep scouring over the whole world in search of rarities. Occasionally, too, new and rare plants are discovered by Americans—either those attached to our exploring expeditions, or by individual traveling botanists, but the great part of the floral treasures are taken to England first, and find their way here afterward. The reason for this is that there is not only more thirst for novelties abroad, but more money to buy them, and while it amply repays Veitch or Low to send agents to the other end of

the world for rare plants, it would be the height of folly for an American nurseryman to do the same. The Duke of Devonshire can well afford to pay £20 for a little slip of a plant to put in the palatial green-houses at Chatsworth, but there are few, we fancy, even in the august precincts of The Avenue, who would care to go and do likewise.

The taste for colored-leaf plants is of very recent growth—mainly, we suppose, because there were so few meritorious ones known to us prior to 1850; but if we may judge from its wonderful dissemination within the past five years, it will not be long before the country will be full of it. Not longer ago than that, if we recollect right, Mr. Lee, of Hammersmith, commenced exhibiting variegated-leaf plants at the Chiswick Horticultural Gardens. Dr. Lindley told him that the managers could give only a special premium for them at that time, but adequate provision would be made for them in the next year's list. The public was surprised at the rare beauty of the plants, and at once agents were despatched to scour the world for other and more curious ones of the same sort. Mr. Lee's plants were of the *Anoechtochylus* genus of orchids, which, it is true, were to be found in small number in British houses before, but not in the quantity or of the merit that his collection embraced. Of the variegated plants previously cultivated, the principal ones were the *Acuba Japonica*, the Spanish bayonet, or *yucca*, the variegated pine-apple, and the old *Agave Americana*. The taste which sprung from Lee's exhibition was greatly strengthened by the appearance of *Begonia Rex* and *Bezanthina*, sent from Borneo by Mr. Hugh Low, Jr., an officer of the government, and by Wm. Lobb, one of Veitch's collectors, who found them growing as wild weeds at the foot of the monster trees of the forests of that island. Some of the varieties have been found growing on the trunks of trees, a few feet from the ground, where a bunch of moss has collected, large enough to furnish a fragment of soil for the rich-tinted epiphyte.

When these were shown at Chiswick they created a real excitement, for nurserymen saw at once that they were bound to revolutionize the mid-winter appearance of their green-houses; and the natural result was that high prices were paid for even the smallest specimens. Fortunately the begonias are propagated with the greatest ease, and thus, although a few plants only were received, the new voyages to Borneo were quite unnecessary. The two plants above enumerated are widely different in color and

appearance, and by the simply mixing of their pollen, an indefinite number of new varieties have been and may be produced. The begonia is called after a Frenchman named Begon, who, in 1638, was Intendant of Marine, but the old begonias which perpetuate his fame bear no comparison in beauty to their Bornean congeners. The leaf of all the varieties is strongly acid to the taste, some of them like sorrel; and it is a question how much bearing this may have upon the varied hues of the leaf. To propagate them, all that is necessary is to cut the mid-rib and several veins on the back of the leaf at their point of junction, and removing to lay the detached leaf on a bit of moss suitably moistened, when, strange as it may seem, little roots will put forth from each cut, and each group make a plant of itself. The leaf of the Begonia Rex is a deep green on the surface, with a band of silvery grayish green running all around it to the point where alone it touches the margin. Elsewhere there is a space of the dark green between the stripe and the edge, as also a roundish spot in the center, or heart. The back of the leaf is of a light green color, sometimes tinged with reddish brown. The Zanthina, however, has a dark purple back, and a plain-colored surface, slightly shot with silver, which glistens like metal in the sun. The mixture of these two species, taking the Zanthina for female and Rex for male plants, gives generally a mixture of the face of the one with the back of the other, and the variety of mottling of the surface is carried to the most illimitable extent.

Among the variegated plants, one of the most curious in this exhibition is the *Maranta* from Brazil and other portions of tropical America. The leaf is smooth edged, of a dark green color, ribbed from the center with stripes of light green, while the back of some varieties, for instance the *Varscewizii*, feels to the touch like the pile of the finest Lyons velvet. The *Caladium* has a leaf shaped like an arrow-head, which is poised on its side on the end of a long slender stem. The leaf is green mottled with blotches of white, which peculiarity in one variety, the *Argyritis*, is so striking as to look like drops of chalky water spilled upon the leaf. In another variety, the *Baraquina*, the broad leaves are painted in rose color, of such even tint as to look like the fading glories of a summer sunset. This latter variety was imported by Mr. I. Buchanan last year from the valley of the Amazon; and another little plant has just arrived, yesterday, from the same region, in company with the plants of the *Aloca-*

sia Metallica, Sphoerostemma Marmorata, Caladium Belleymei, and C. Baraquina, each of the illustrious quartette thus making its first American début at this show of the American Institute.

The sports of nature's colorman are evidenced in the striped fern, *Pteris Argentea* here, which has just come from Borneo—an exception to the good habits of the graceful ferns, the illustrious Fanny not excepted.

Since our last article was printed, several important additions have been made to the exhibition. The highly perfumed flower of the Victoria Regia, came by express from Philadelphia on Friday, and now floats on the miniature house pond, a very vase of odor. The petals of the flower are a pure waxy white, the inner ones deeply stained with crimson, while the petals and stamens when we last saw it were hidden from view by a cap of the deep dyed petals. The flower is not yet fully opened, but will probably be so Friday afternoon or evening, and one must watch it for a whole day to see the beautiful changes which its tints undergo. The opportunity of seeing so rare and wonderful a plant as this, will probably not occur in a generation again, and none should neglect to take advantage of it when thus fortunately presented.

THE ORCHIDS OR AIR PLANTS.

In certain seasons of the year the dense forests of those countries of Asia, Africa, and America, which lie in the torrid zone, are filled by a powerful fragrance which, sometimes, at a great distance, betokens the presence of a curious family of plants. Just after the season of rain has commenced, these wondrous productions of the vegetable world, recovering from their long rest through the summer drouths, unfold their glories one by one, and when in full bloom, load the sylvan atmosphere with odors. The spicy breezes which "blow soft o'er Ceylon's isle," are no doubt in part perfumed by their breath, a breath, which, considering the romantic uncertainty which shrouds their origin and growth, the superstitious natives think is borne from celestial countries. The flowers of the various families of these plants mimic the odors of the new-mown hay, wall-flowers, violets, pomatum, anniseed, and angelica, of noyau, cinnamon, allspice, citron, musk and honey. Some of the most fragrant yield their perfume only in the day-time, while others, like the Epidendron nocturnum and Brassavola nodosa, waste their sweetness on the midnight air.

Their brilliant colors and graceful or grotesque shapes render them as peculiarly attractive to the eye, as their fragrance is pleasing to the sense of smell, while from the fact that unlike all other plants which have yet been discovered, they need no soil to grow upon, there is a shade of mystery and romance thrown about them which easily explains the reverence in which they are held in the countries where they grow. These plants are known to botanists as orchidaceæ, and to common people as orchids, or air plants. Hanging over the basin in which the royal Victoria Regia floats in her majesty at Palace Garden, is a collection of over fifty varieties of these curious plants; and as we presume all our readers who have not the opportunity to see them will be glad to know something of their nature and appearance, we have spent some time in examining the plants and searching their history.

Loudon, that greatest of botanical encyclopedists, writes more fully upon their varieties than any other person, but the fragmentary history which he found space for in his cumbrous volume, even with the aid of his copious quotations from Bateman, is far too brief. In Demerara, that deadliest and most insidious of all poisons, Wourali, is thickened by the viscid juice of one of the orchidaceæ, and in Amboyna, says Bateman, the true "Elixir of Love" is prepared from the minute farina-like seeds of Grammatophyllum speciosum. In superstitious Mexico, the sentimental people give to the plants a mystic power of speaking the language of grief and joy, of friendly greeting, love, and bitter hatred, and even endue the spiritu-sanctu species with a holy influence. Not an infant is baptized, not a marriage celebrated, not a funeral obsequy performed, at which the aid of these flowers is not invoked to give expression to their feelings; they are offered by the devotee at the shrine of his favorite saint, by the lover at the feet of his mistress, and by the sorrowing survivor at the grave of his friend. Whether, in short, on fast days or feast days, on occasion of rejoicing or in moments of distress, these flowers are sought for, and regarded as indispensable. "Flor de los Santos," "Flor de Corpus," "Flor de los Muertos," "Flor de Maio," "No me olvides," (forget-me-not,) are but a few names of the many which might be cited to prove the high consideration in which the favorites are held in the new world. In the East Indies, Rumphius tells us, with every appearance of self-assurance, the flowers shrink from contact with persons of low caste,

displaying their glories and shedding their perfumes only when worn by princesses or ladies of high degree. In Honduras, again, the large hollow cylindrical stalks of a fine species are made into trumpets by the children of the country, and pour forth the tortured notes in fitful floods.

Thus it would seem as if the air plant was not created for the profit of man beyond pleasing his senses of sight and smell; nor is it of advantage as food for animals. But nature, ever mindful of the wants of humanity, has made even some of this curious family of plants subservient to human comfort. The bulbs of the Maxillaria bicolor, contain a large quantity of an insipid watery fluid, which is generally sucked by the poor native of Peru in the dry season; a similar fluid is extracted from another variety in Mexico, which is used as a cooling draught in fevers; in New Zealand certain species are of considerable value as esculents; and Mr. Bateman even says that in Guiana, the soles of the shoemaker are as much indebted to the viscid matter obtained from the Catesetums and Cyrtopodiums, as are the poisoned arrows of the Indians.

Of all the strange properties of this family of plants, that of taking a resemblance to various objects of the animal kingdom, is, perhaps, the most striking. Says a writer in an old volume of a London magazine, these shapes are "so strangely varied, that

'Eye of newt, and toe of frog'

are the least singular of the forms that lie cowering in the bosom of their petals; the heads of unknown animals, reptiles of unheard-of figures, coils of snakes, rising as if to dart upon the curious observer, may all be seen in the blossoms of the various species, whose very flowers may be likened to unearthly insects on the wing." This language may seem rather ill-chosen, but even the cool-headed Loudon remarks, that "in our native species, we find the bee, fly, spider, lizard, man, &c., surprisingly imitated; and in those of warmer climates, swans, eagles, doves, pelicans, and other birds." The wonderful flower called "The Holy Ghost plant," is of this species, and many of our readers will be able to attest from personal examination the strange resemblance the specimens sometimes bear to a gentle dove descending on spread pinions from the sky. What wonder then that this and other varieties should be regarded with wonder and reverence by superstitious savages! In India, the higher varieties,

such as arides, vandæs, saccolabiums, are chosen by the higher classes, while the commoner varieties of oncidias and epidendrons, suffice as mediators between the lower "mudsills" and their angry gods.

The orchids are divided into two great classes—terrestrial and epiphytes. The former, which are common in our own and more northern latitudes, and of which the lady-slipper is a type, grows, like any other plants, on the ground, to "draw nutrition, propagate, and rot;" while the other class are found only in the torrid latitudes, where they cling to the trunks of living or dead trees. Of both these classes there are many varieties, and, in fact, it is stated in Appleton's New American Cyclopædia that of the latter there are found in Java alone 300 varieties. The tropical varieties were introduced into England about fifty years ago, but only came in their present popularity within the past twenty years. The old varieties were *Vandateres* and *Oncidium flexuosum*, with a few epidendrons, but the busy agents of the London nurserymen and the Kew botanical gardens found new and more strange and beautiful varieties in the solitudes of Javan or Amazonian forests, and sent them home to create a popular enthusiasm, as more recently the begonias have done. From the East Indies the *Saccolabium guttatum*, *Phœlonopsis amabilis* and *grandiflòra* were very beautiful, and gained much attention among many varieties, and among those from the West Indies came *Odontoglossum*, *Calia*, and the beautiful *Stanhofea*, whose fame spread quickly among amateurs.

When or by whom they were first introduced into the greenhouses of this country, we cannot say, unless the honor be due to the late Thomas Hogg, sr., who imported 100 varieties many years ago, and cultivated them for his own pleasure with success. They attracted little attention until a few specimens were exhibited by Dr. James Knight, we understand, at a horticultural show at Old Clinton Hall five years ago, since which time they have come into great favor. The Doctor, himself, encouraged by the attention which his first exhibition met with, imported nearly 100 varieties that season, and since that time Mr. Van Vorst, of Jersey City, who is said to have the finest collection of exotics in this country, has made very large importations at great cost. We have heard of another gentleman who paid last year $30 for a little plant of the Phœlonopsis variety, on which there were

but three leaves, and another who has single specimen plants which cost him $50.

Of all the air plants perhaps the most beautiful is one named in honor of the Duke of Devonshire, Deudrobium Devoniana, the flowers of which look as if made of satin covered with brilliant hues. The ground color is white, tinted with purple and yellow in equal proportion. The petals and sepals are tipped with purple, while the labellum or lip is tipped with purple, and stained with a golden yellow. The Lelia autumnalis has its petals white where they join at the centre, and then by regular gradations of tint the color changes to a deep rose, with pencilings of crimson drawn through it. The column and lip form a tube which terminate in a rose-tinted fan spread open to its full extent.

One of the most curious is the Brocklehurstiana bucephalus, whose five alternate flowers grow from a stem which comes from the bottom of the mass of roots, and hangs pendant like a tassel. The sepals of the flowers are of a bright straw color, and the petals a deep yellow at the base which fades into a lighter shade as it approaches the point, the whole being dotted with flecks of gold throughout. The column is dyed orange, but the terminal fan-like lip is white with purple dots. The "column" of the air-plant is composed of the organs of fructification joined in a common mass, but how the fertilization of the flowers is accomplished is one of the mysteries which even now baffle the study of botanists. The manner in which the plant is disseminated and vegetated is probably thus: The fecundated seed, pollen, sporule, germ or whatever it may be, borne on the breeze, is lodged in the bark or at the fork of the limbs of a tree. Here, the heat and moisture of the air causes it to germinate, and at once the young plant throws its roots out into the air. Fed on nothing, so far as has yet been ascertained, beyond moisture and the gases of the air, it runs regularly through all the stages of growth, and in due time produces its flower and seed. In artificial culture, it has been found that the plant will never properly thrive while its roots are compressed, even in moss, much less soil, and that after languishing thus to the very verge of dissolution, if the roots are exposed solely to the air, the lost vigor is restored, and the plant thrives famously. The usual way to grow them is to attach them firmly to bits of wood or cork, and hang them in mid-air from the green-house roof, giving them

that high degree of heat and moisture which they get in their native localities. Some varieties do well in pots, if placed merely in cut fibrous peat, mixed with bits of broken flower pots, and well drained at the bottom to remove all stagnant water; but again there are others whose stems grow downward from the roots, as previously stated, and which can only be placed in an open wire-basket.

We are not aware that any chemical analysis has been made of the plants to ascertain the proportion of mineral matter they contain. It would seem most likely that this should be very small, for otherwise we should have to believe, which is now deemed an absurdity, that they could get inorganic matter in sublimated form from the atmosphere. Certain it is that the bare roots hung in the air, without apparently a particle of soil, will produce flowers and new plant germs, and unless we are to believe that each contains in itself all the inorganic constituents of new plants, or is able, by some sort of vital force, to decompose enough from smooth blocks of pine or slabs of cork, the question of their growth is an inexplicable mystery. Will not some of our best chemists solve the perplexing riddle?

REPORTS OF COMMITTEES

ON MANUFACTURES, SCIENCE AND ART.

Report on Neer's Dynamometer.

The Committee on Manufactures, Science and Art, respectfully report:

That they have examined a model of Neer's Dynamometer and Register, and are of opinion, that when properly constructed and graduated, it cannot fail to measure and register the pressure and velocity communicated to a revolving shaft, to which it may be adapted, from a steam engine or other prime mover; and that it will therefore furnish an estimate in horse power or any other conventional unit of force, the amount of power derived and expended. It is unnecessary that the committee should enlarge upon the practical utility and importance of an instrument by which the objects above stated can be obtained.

JAMES RENWICK,
EDWARD W. SERRELL,
BENJAMIN GARVEY,
Committee.

NEW YORK, *July* 2, 1860.

Emery Vulcanite.

The Committee on Manufactures, Science and Art, respectfully report:

That the committee have examined the Emery Vulcanite with a view to comparing it with other abrading substances used in the arts, particularly in the arts where metals are operated upon, and that they have found it to possess some important properties which render it superior to the other substances employed for making, grinding and polishing, when finishing files, scythes rifles and other like articles.

The substances consists of India rubber mixed with emery powder of any desired degree of fineness, the whole mass being vulcanized at a high temperature in molds, which impart the desired form to the articles. The peculiar properties which the compositions possess are due to the India rubber; wheels and whetstones have long been made of emery powder held together by glue, shell-lac, rosin, or burned clay, &c., but they were found to be brittle; to be liable to get out of shape, and to possess little advantage over native stone. Emery Vulcanite, on the contrary is tough, is not liable to chip or fly to pieces, and whenever a wheel is worn out of true it can be faced to any contour in a lathe by using a hot iron as a turning tool. Table steels, finishing files, rifles, &c., are made in this substance of any shape, and they possess the important property of being as effective when nearly worn out as they were the first day of their use.

NEW YORK, *December* 19, 1860.

JAMES RENWICK,
EDWARD W. SERRELL,
BENJAMIN GARVEY.

DEATH OF JOHN A. BUNTING, ESQ.,

ONE OF THE VICE-PRESIDENTS OF THE AMERICAN INSTITUTE.

Proceedings of the American Institute in relation to the death of John A. Bunting, Vice President, at a special meeting held July 10, 1860. President Wm. Hall in the chair.

Mr. Thomas McElrath offered the following resolutions, which were read and unanimously adopted by the Institute:

Whereas, In the dispensation of Divine Providence the American Institute is bereft of one of its chief officers and most active members; and *whereas*, this institute entertains a high appreciation of the long, useful and disinterested services of their deceased co-laborer in the various responsible positions which for a long series of years he held in this body; therefore,

Resolved, That in the death of their first Vice President, John A. Bunting, the American Institute has sustained a severe loss, and the common cause of agriculture and the mechanic arts a stedfast and devoted friend.

Resolved, That in this sudden bereavement this Institute not only lament their own loss of a valued officer and esteemed brother, but deeply sympathize with the family of the deceased in their still greater loss of a husband and parent.

Resolved, That the members of the Institute do now proceed in a body to the late residence of the deceased, to join in the solemn service which consigns the dust to its mother earth and to assist in performing the last sad office which can be rendered to the mortal remains of our late and lamented Vice President.

Resolved, That the foregoing preamble and resolutions be entered upon the minutes of the Institute, and that a copy thereof be transmitted to the family of the deceased, and published.

Adopted unanimously, and the Institute adjourned.

H. MEIGS, *Secretary*.

ADDRESS

BEFORE THE AMERICAN INSTITUTE, AT PALACE GARDEN, OCT. 4, 1860.

BY PROFESSOR CYRUS MASON.

The green-houses of the north have filled this hall with their richest tropical collections. We stand in such a garden as Eve lamented to abandon; but could she have foreseen the ingenuity and enterprise of her sons, she might have softened her lament over flowers that never would in other climates grow: for, here are blooming, in our wintry regions, the very species she cherished.

The earliest men, the men of the tropics—if we may trust Columbus and Americus—lived idly, yet gently and modestly in gardens of native fruits, sheltered by leaves, without clothing, and with no wants which their gardens did not supply. We have transferred their gardens into a wintry climate, yet not without many labors and arts suggested and enforced by our passage from the equatorial to these frosty regions.

To make these frosty regions the cheerful homes of civilized men, was the labor assigned to us by our great Taskmaster when he elevated the pole so as to make a fruitful summer under a northern sky, and, by the vicissitudes of summer and winter, to *make* the wants which *make* our civilization.

The great end of civilizing labor is to fill the habitable parts of the earth with a happy people. War and want spread men, at an early day, thinly over all regions capable of a fruitful summer; but their wide dispersion, and the violence which induced it, with the fear of further disturbance, led to national exclusiveness, while conflicting religions cherished national hatreds. At the gates of each nation were placed walls, forts, batteries, prohibitions to exclude the men and the products of other nations. But, occasional travelers, like Herodotus and Marco Polo, brought

home the products and the knowledge of remote nations. Here and there a wise ruler got the start of priests and soldiers, and sent men to neighboring nations to procure commodities for civilizing his own people; but warfare, either with pikes or crosiers was the ordinary, and was deemed the normal state of the nations. No truth was more obstructed than the one now generally acknowledged, that every section of the earth is capable of products requisite to the civilization of every other section. I well remember the deep sensation at the old Tabernacle, when John Quincy Adams took his stand on this general principle of social philosophy, and defended the English in compelling the Chinese to open their commerce to the whole world. The discourse was worthy of the man and the principle, and proved to the public mind, that commerce is the great civilizer, and that it is a spurious honor which sinks where commerce long prevails.

It is now conceded without argument, that the development and distribution of the resources of the whole earth are essential to the high civilization of any nation. To will this good work is present to all enlightened men, but how to perform it, is the great practical question of our age.

The founders of the American Institute had a foresight of this great work, and assumed a share of it. How earnestly and persistently that share of the work has been performed, is known to the public. It is made known by a long series of yearly fairs; it is made known by the yearly volume published by the State; it is made known by the weekly labors of the Farmers' Club and the Polytechnic Association, which are published as widely as the labors of any kindred societies on earth. It is made known to you this evening, by your standing in the midst of this tropical garden: for the American Institute inspired that weather-worn captain, who stole the becalmed hours of his voyage on the Brazilian coast, to gather from the tallest tree-tops those splendid orchids which hang around you, and prove to you, that the air as well as the earth and the water is a parent of flowers.

But we must not deceive ourselves about the progress of the great work of the development and distribution of the civilizing resources of the earth. The steps have been few and flattering, while the pauses have been long and disheartening.

Going back about one hundred years, we find in the Parliamentary Reports a petition for allowing the manufacture of iron in the American colonies, for English use, not for the convenience

of the colonies, but to save the forests of England from being converted into charcoal. And to show what danger awaited those forests, the petition shows that the making of iron in England has risen suddenly to the enormous product of twelve thousand tons per annum. About the same time a man was hanged in London for poisoning the common air by burning coal in his smith shop. But last year England exported four millions of tons of iron, and made it by burning the same coal. And yet the iron ore and coal of our country exceed those of England as much as our territory is larger than hers.

Before the coal and iron of England were developed, Elizabeth had fewer subjects than Governor Morgan has constituents, and they were worse provisioned than the present people of England.

We are making good progress in our production of iron. We must soon produce iron for South America. Every year we are bringing the coal and iron nearer together, and nearer to the sea by new railroads; and every year we are insuring that great civilization which nothing but a disturbance of this Union can check. We are doing this, because the coal field of the world is ours, and the iron ore of the world is ours. Nothing which requires a yearly reproduction from the soil can ever be the ruling product of a nation, which has inexhaustible mineral resources. Men plant wheat and cotton, but God planted the coal fields and laid up an inexhaustible store for human use; and the same is true of iron, when it lies near the coal field. Corn and cotton are princely: Egypt and England had corn; Brazil and India had cotton; but what were they without iron? and what is iron ore without the coal? Deprive England of coal, and she would fall back on the times of Elizabeth, for her iron ore would be worthless. But coal is power—concentrated power—available power—power to reduce the metals, and power to adapt and employ the metals for endless purposes of civilization. Coal is king.

The earliest inventors had little for suggestion but their dire necessities; they had few resources, and no tools. Their great task was the contrivance of artificial climates. Every movement northward impelled them to new contrivances of this kind. The bower, the simplest garment, the fire kindled in the open air, the tent, the coat of sheep's skin, have ripened into all the useful and elegant appliances of clothing, housing, warming and cooling of our winter and summer.

The materials and tools of the inventor have been multiplied indefinitely; and yet those of the greatest importance cluster round the coal pit and the iron furnace. The steam engine was suggested at the mouth of the coal pit; the coal suggested the hot blast and the blower; in short, cheap iron and cheap fuel are the two great powers of the world's civilization.

The play of these powers among the other resources of the earth, employs the ingenious and the enterprising, while it is our part to facilitate the movement by collecting and diffusing the lights they strike out.

ANNIVERSARY ADDRESS

BEFORE THE AMERICAN INSTITUTE, AT PALACE GARDEN, OCT. 6, 1860.

BY THE HON. WM. H. ANTHON.

Mr. President, Ladies and Gentlemen:

When the American Institute, whose anniversary we celebrate to-night, was incorporated by the State, its objects were declared to be, "The promotion of agriculture, commerce, manufactures and the arts."

Agriculture was rightly named first, in this order, as the most ancient as well as the most useful employment of mankind; the one, in fact, upon which all the rest depend, and without which the human race would soon relapse into the condition of wandering barbarians.

Commerce, manufactures and the arts were also included among the objects of the Institute, because, although not forming the foundation of the structure of civilization, they yet are essential to its complete development and perfection.

The Institute has, in my humble judgment, done a great work in times past; it has collected at its fairs the cultivators of the soil, and it has shown them, by the encouraging rewards which it has bestowed upon successful effort, that in this age of the world the triumphs of the plow and the pruning hook are more highly esteemed than those of the spear and the sword; that we congratulate ourselves upon what we have produced rather than upon what we have destroyed; and that there is more true glory, because more true usefulness, in subduing the ruggedness of the soil and in rendering nature subservient to the good and convenience of mankind, than in the subjugation of provinces and all the pomp and glory of war.

Nor has the usefulness of the Institute been limited to this class of persons; for its halls have constantly been crowded with the learned and the curious, attracted by the beautiful and interesting displays of that mechanical genius which it has done so much to foster.

Here have been seen the results of patient industry and the triumph of the inventor's skill, and here has many a meritorious mechanic received the encouragement which was essential to success, and without which some truly useful discovery might have slumbered in obscurity, and perhaps died with its originator.

The ornamental arts, also, have not been neglected; and the visitor was wont to see on every side objects which charmed the most cultivated taste.

We see no specimens of mechanical skill around us to-night; there is no great engine puffing and panting in the distance, moving with its iron arms the mighty press, or those great Cyclopean masses of machinery which, under its influence, seem instinct with life and power.

The Institute on this occasion has set before you a display of the productions of nature improved by the fostering care of man, a show of the most beautiful plants and flowers, and of the choicest fruits. Agriculture and horticulture have, on this occasion, taken the position which used to be assigned to manufactures, and Nature, in her most beautiful manifestations, sits enthroned in the place of Art.

The citizens of New York are indebted chiefly to Messrs. Carpenter and McElrath, of the Board of Managers of the American Institute, for this chaste and beautiful exhibition, which has given so much pleasure to refined and cultivated minds.

The idea was a noble one, and it has been ably carried into effect by the active and zealous co-operation of the entire management of the Institute.

An exhibition of this character was peculiarly appropriate at this time; nature has, during the past season, been most bountiful to us; the Divine promise, that "seed time and harvest shall not fail," has been more than fulfilled; with a very few exceptions peace and plenty reign in every part of our vast national domain; our fields have been bright with the rich harvest of the golden grain; our gardens and orchards have yielded abundantly, and our store-houses and granaries are filled almost to repletion with the abundance of the earth.

Commerce has awakened to new activity at the call of successful agriculture, and the canals and railroads which bind the great West to the Atlantic coast, taxed to their utmost capacity, while the tall ships which but so few months ago lay rolling idly at their wharves, are now bearing the agricultural products of our country to distant lands.

Manufactures and art, too, have felt the impetus which the generosity of nature to the agriculturist has given to every department of human industry, and have sprung into renewed life and activity.

Apart, then, from the reasons of convenience which led the managers of the Institute to make this year's exhibition exclusively agricultural and horticultural in its character, it was right that at this particular period manufactures and the arts should yield their place, and in the midst of the rejoicings of tens of thousands at the richness and abundance of the harvest with which we have been blessed, allow full scope for the celebration of the praises of what the immortal Washington declared to be "the most useful, the most healthful and the most honorable employment of man."

There is, beside, a higher and nobler significance in this beautiful exhibition. It seems to me that its varied treasures of fruits and flowers are like a hymn of thanksgiving, praise and gratitude to the Eternal giver of all mercies, for the abundant blessings which he has bestowed upon us; and that if the beauty of these flowers were their only use, they may, in this point of view, to some minds at least, fulfil a grander purpose than the mere utilitarian ever dreamed of.

The strictly practical results of an exhibition like this are, however, the points to which I desire this evening mainly to direct your attention.

You will observe that the prevailing character of this exhibition is horticultural rather than agricultural—that is to say, that the beautiful productions of nature which you see around these halls, proceed chiefly from the garden and orchard, not from the meadows and fields.

The spacious orchards and nurseries of Messrs, Ellwanger & Barry, of Rochester, Hovey & Co., of Boston, Lewis Menand, of Albany, Smith & Hanchett, of Syracuse, W. S. Carpenter, of Westchester, and others have furnished 500 varieties of pears and more than 200 varieties of apples, many of which, are

of surpassing beauty, and doubtless of most excellent flavor; although on this last point little is known by the general public, since the patrons of the Institute are famous for their strict obedience to the injunction: "Touch not, taste not, handle not," an injunction by which their self-denial is oftentimes severely tested. The exhibition boasts more than thirty different kinds of plums.

Grapes, of great beauty, in large and perfect clusters show the attention which this beautiful branch of horticulture has justly received, while a large and varied collection of native wines from California, Missouri, Ohio and our own State gives promise of the time when we shall cease to be dependent upon Europe for the juice of the grape.

Regarding as I do, the introduction of an abundance of cheap light wines, similar to those used by the people of France and Germany, as likely to prove a most beneficial substitute for the strong and oftentimes adulterated liquors now so generally used among us, I trust that increased attention will be given to the cultivation of the vine in order to secure so desirable result.

The same may be said of the cultivation of apples for the manufacture of cider, which was at one time discontinued in many parts of the country, and the trees cut down through a somewhat excessive zeal in behalf of the temperance cause.

The moderate use of stimulants may or may not be hurtful, as each will decide for himself, but all must agree, that if men continue to use them, it is desirable that they should be as little deleterious in their character as possible.

Before passing from the subject of fruits, it may be remarked that it is conceded that the exhibition before you is the finest and most extensive ever displayed in the United States comprising as it does, more than 3,000 varieties, and that the improvement of successive years in the character of fruit, is the best evidence of the importance of scientific culture fostered and encouraged by societies like the Institute.

The discussions of the "Farmer's club," and the interchange of views which its meetings encourage, have been useful auxiliaries in producing these results; as also have been the meetings of pomological societies and fruit growers conventions in our own and sister States, and especially in the city of Boston. The generous emulation which such societies create leads to increased care among the cultivators of fruit; they are induced to study

more carefully the requisites of soil and climate, and in this manner to bring to great perfection specimens which under less favorable circumstances would be dwarfed and sickly.

I have always considered that science achieved one of the greatest triumphs in the grafting of the fruit tree; by this wonderful, yet, simple expedient, a barren fruitless stock is made productive, and nature herself is forced to bend obedient to the will of man.

It is said that observation of the crossing and growing together of two branches of different trees in a crowded forest, first led to the art of grafting, and it is precisely such facts as these, when communicated from man to man, and especially when diffused through the medium of such societies as the American Institute, that tend to increase the great sum of human knowledge and to lead in the end to the most valuable discoveries.

I doubt not that the intelligent cultivators of fruit, who have attended this exhibition, with their beautiful productions, have each and all learned something new and interesting from being thus brought together, that they have communicated to each other the results of their personal experience, and that in this respect at least, their attendance has not been unprofitable. There is an important interest, and it becomes more and more so every year. Fruit is one of the necessaries of life, and at certain seasons is deemed essential to health; the demand for fruit in this great metropolis and in its surrounding cities, is enormous, and Europe furnishes a ready market for any surplus of those hardy varieties which will bear transportation. The cultivation of fruit in the neighborhood of our large cities where land is held at high rates, offers great inducements to enterprize, and seems to be a far more profitable employment than the attempt to raise cereals in vain competition with the cheap and fertile prairies of the West.

It is a matter of public concern, then, that the American Institute has taken this subject seriously in hand, and it is to be hoped that this display of fruit, superb as it is, will be but a beginning of a truly praiseworthy and useful movement.

If the utilitarian should condemn this part of our exhibition, I should have no difficulty in bringing his censorious remarks to an end by filling his mouth with some of these delicious fruits, and calling his attention to their great improvement in beauty, richness and flavor, but it may, perhaps, seem to be more difficult

to convince him of the utility of the cultivation of plants and flowers.

The task, however, will be deemed comparatively easy if we but consider how greatly the study of the peculiar properties of the simplest plants of the fields has enriched the materia medica of the physician, and has furnished not only the great staples of manufacture and commerce, but also the beautiful tints and colors which add so much to the value of the productions of the loom and the spindle.

In horticulture and botany, as in all other pursuits, the slow and cautious utilitarian follows in the footsteps of the enthusiastic devotee of science, and oftentimes, without even so much as an acknowledgment, avails himself of the results of his toils and privations.

The orchidaceae or air-plants, of which more than fifty varieties are here displayed, may be seen suspended near the centre of the hall. These singular freaks of nature, as they have been called, do not derive their nourishment from the earth, but from the gases and moisture of the atmosphere, and, so far as the most scientific observers have been able to determine, they literally "feed on air," a very unsubstantial kind of diet, which, it is feared, that some of our politicians may be compelled to subsist upon, whichever way the coming elections may be decided.

It is said that if the roots which the orchids throw out into the surrounding atmosphere, be compressed, even so slightly as by a covering of moss, the plant will not thrive.

The great variety of color of these plants, sometimes so delicate and sometimes so brilliant, and the beautiful and varied forms of their leaves will repay a close and careful examination.

The orchids are indigenous to the West India islands and Mexico, and fine specimens are also found in Peru and other parts of South America, and in the East Indies. They hang from trees and rocks without any visible connection by which they can derive sustenance from the earth.

Some species contain a deadly poison which the Indians make use of to envenom their arrows, while another variety contains a large quantity of fluid which is used, in those countries where it abounds, as a cooling draught in cases of fever.

There are here also several hundred varieties of ferns, plants whose traces, found among the primitive rocks, have furnished such interesting topics of discussion to geologists. You will not

fail to admire the beautiful and graceful forms of some of these "earth builders" as they have been called, and the richness of their colors.

Mr. Isaac Buchanan, of Astoria, has furnished a large number of these interesting plants, while the very choice specimens in yonder glass case are from the collection of Dr. Knight, of this city. Ferns are much sought after for conservatories, their varied hues supplying the place of flowers when the season of their blooming is past.

If you stand for a little while in yonder corner, you may fancy yourself in China, India, or in one of the Islands of the seas; for in front of you is the tea plant, on your right is the cinnamon, and on your left the clove, while not far off is the caoutchouc, or India rubber plant, the product of which the genius of our own countrymen has made useful in so many varied forms. In fact, within the limits of this hall, there are gathered together specimens of the vegetable productions of the whole world, and the admirer of nature may gratify his taste to as great an extent by making the circuit of this room, as he would have been able to do some few years ago by making the circuit of the globe. Here is the enormous apple from Illinois, called "Gloria mundi," weighing three and one-half pounds, and reminding you of that peculiarly American institution, apple pie; there is one of the largest and most beautiful specimens of the Sago palm from South America, and near it the bristling Aguava Americana, or century plant—in popular tradition said to flower but once in a hundred years; while in yonder fountain are exhibited the leaves of that wonderful plant, the Victoria Regia, whose reticulated structure is said to have suggested to Sir Joseph Parkton, the great idea which runs through the construction of that wonderful building, the Crystal Palace, now standing at Sydenham, in England.

This beautiful specimen, whose flowers emit a fragrance which at times perfumes the entire hall, is from the conservatory of Mr. James Dundas, at Philadelphia, a gentleman who is famous for his horticultural pursuits, and has completed, at a very large expense, perhaps the most perfect arrangements to be found any where in the country, for the care and management of this and similar plants.

There are several varieties of the Victoria Regia, and, in fact, it is considered by some naturalists to be a distinct genus of

plant, no two of its flowers are precisely alike, and it is, therefore, most interesting to watch their gradual opening, and speculate upon the variations of form and color which present themselves in each; I think that you will agree with me that the delicate pink, which the petals of this flower display, is perhaps, the most exquisitely beautiful color to be found in the whole range of nature's productions.

Naturalists fall into raptures about this color, and compare it to the last fading glories of the evening sky, the blush of beauty and a thousand other beautiful things; but inasmuch as I am neither a naturalist, nor the son of a naturalist, I must beg you to make your comparisons for yourselves.

The Victoria Regia, or great American water lily, was first discovered by the botanist Haershe, while crossing the Rio Marmose, one of the great tributaries of the Amazon. It is said that when the simple-headed and enthusiastic naturalist discovered this extraordinary and beautiful flower, in the marshes near the banks of the stream, he fell on his knees in a transport of admiration.

Monsieur D'Orbigny calls the Victoria Regia "one of the giants of the vegetable kingdom;" he describes his first view of it in the following terms: He was ascending the Rio Platte in a canoe, having in his company two Indians, when he observed, "that the marshes on either side of the river were bordered with a green and floating surface, nearly a mile of water was overspread with huge, round and curious margined leaves, among which glittered here and there the magnificent white and pink flowers, scenting the air with their delicate fragrance."

The first flowering of this lily in the United States, which took place some years ago at Springbrook, near Philadelphia, the seat of Caleb Cope, Esq., was an occasion of the greatest interest, and collected crowds of visitors. There are at present in this country, I believe, three specimens of the Victoria Regia—the great expense attending their care, preventing their general introduction as an ornament to the country seat.

Thus, ladies and gentlemen, we have passed through these halls together, and I have given you my humble opinions upon what we have seen precisely as any other visitor might do, and without pretending that they carry the slightest scientific weight. I have left my friend, Mr. Williamson, to his own reflections, and even now I think I hear him muttering to himself, what is the

use of all this? I will tell him and you what is the use of horticulture, and what claim it has to be regarded as a science.

Lord Bacon in his essay on gardening says: "God Almighty first planted a garden, and indeed it is the parent of all human pleasures." Horticulture in its most extensive sense includes not only the raising of vegetables, fruits and flowers, but also the beautiful department of landscape gardening, in which the late lamented Downing gained so much honors for the American name. It may be said with truth, that horticulture is at the same time the earliest indication of civilization, and the result of its highest development.

The wandering barbarian who settles in some favorite spot and removes thither the fruit tree, or the vine, has already begun to be civilized, while the triumphs of horticulture are reserved for those countries where the highest civilization with its attendant wealth demands that the abode of refinement shall be embellished with all the resources of nature and of art.

Herder, in his Kalligone, carried away by his love for horticulture, a little I think beyond the bounds of due moderation, calls it "the second liberal art," conceding the first place to architecture.

Addison says, in the Spectator: "I look upon the pleasure we take in a garden, as one of the most innocent delights of human life; a garden was the habitation of our first parents before the fall, it is naturally apt to fill the mind with calmness and tranquility, and to lay all its turbulent passions at rest; it gives us a great insight into the contrivances and wisdom of Providence, and suggests innumerable subjects for speculation."

Horticulture increases the beauty and comfort of our homes, and thus tends to foster and cherish the domestic virtues, it is in this point of view, of great importance in the social system, as much as the love of country is inseparably connected with the love of home. Apart then from all the uses of horticulture which are evident to everybody, such as the raising of fruits and vegetables, it has a moral use, so to speak, which cannot be overrated. The influence of horticulture upon the young must necessarily, it appears to me, be beneficial; the pleasures of the garden are pure and simple, they produce a love of what is beautiful in nature, and thus tend to elevate the mind. Such enjoyments, however it is much to be regretted, in the city at least, must necessarily be confined to the rich. The demands of commerce and

manufactures require every foot of space which the dwelling-house can dispense with, and gardening at the rate of two dollars or more for every square foot of the land employed, is a luxury which must necessarily be confined to the few.

It has been proposed, that under the auspices of the American Institute, a garden should be established which should be filled, winter and summer, with the choicest and most beautiful flowers and shrubs, where the public might have an opportunity, at a small expense, to indulge this most refined and beautiful taste. I think that such an institution would be a great public benefit, that its influence would be most healthy, and that horticultural fairs might thus constantly be held, the effect of which would not only be to improve the cultivation of plants and flowers, but also to refine and elevate the masses.

With all our great energy of character and determined spirit, qualities necessary to found empires, we need, to a great degree, that refinement which is necessary to adorn and embellish them.

Exhibitions of art and exhibitions of nature, side by side with art, are the proper means of refinement, and it is to be hoped that as time rolls on they will become more and more general among us.

The love of horticulture which the American Institute, through this beautiful exhibition, has done so much to encourage, has been a source of the highest enjoyment to some of the most eminent men of our own and other lands, and of the present as well as of the past ages.

The Academus or public garden of Athens was the resort of her philosophers and poets, and the fact that Socrates and Plato taught among those groves shows that these great men were not indifferent to the charms of nature.

So great was Pliny's admiration for the beauties of landscape gardening, that he not only contrived to view some portion of the scene from every window of his Tusculan villa, but he even constructed a couch which had one view at the head, another at the foot and a third at the back.

Pope's villa, at Twickenham, and Sir Walter Scott's beautiful Abbottsford are still proofs of the love which these two eminent men entertained for horticulture; a feeling which was shared by one who would be deemed the most unlikely person to entertain it, namely, by Lord Jeffrey, the terrible critic of the Edinburgh Review.

Lord Jeffrey's seat was called Craigcrook, and is near the city of Edinburgh; it appears originally to have been an old building, respectable from its age, but inconvenient for a family, and the ground was merely a kitchen garden of about an acre. "By the help, however," he says, "of neatness, sense, evergreens and flowers, precisely such means as we may all use about our dwellings, it was soon converted into a sweet and comfortable retreat."

It appears that Mrs. Jeffrey, who was an American lady by birth, set an example which doubtless other American ladies have followed, since horticulture is a favorite science with the sex, for she knew the genealogy and the history and character of every shrub and flower in the garden.

In our own country, Washington, Jefferson and Hamilton have made the names of Mount Vernon, Monticello and La Grange immortal, as the spots where, throwing off the cares of state, they beguiled away the hours among the peaceful pursuits of horticulture.

But an art so useful and so beautiful certainly does not need the sanction of great names, there is something in our hearts that ever responds to the sight of beautiful trees and flowers.

"A thing of beauty is a joy forever."

And I envy not that man's feelings upon whom the triumphs of the horticulturist's skill produce no effect.

Finally, I have endeavored to draw from this refined and elegant exhibition some few of the lessons which it teaches, and these are:

First of all, the effects of patient care and industry in improving the good things which nature has lavished upon us.

Next, the influence of horticultural pursuits upon the individual character, and upon the nation at large.

And last, but not least, a lesson of gratitude to the Great Giver of all good, who has willed that through the primitive employment of the horticulturist "the desert place shall rejoice, and the wilderness shall blossom like a rose."

SKETCH

OF THE RISE AND PROGRESS OF THE AMERICAN INSTITUTE.

BY THOMAS McELRATH.

On the nineteenth day of February, in the year one thousand eight hundred and twenty-eight, at Tammany Hall, in the city of New York, was held the first meeting of the American Institute of which there is any official record.

A number of public spirited gentlemen of New York had met occasionally for some months previously, and discussed the subject of the formation of a National Association, with a view of giving aid and support to the advocates of protection to American labor.

On the adoption of a constitution and the perfecting of an organization, the politico-economic character of the association was not prominently set forth. The name of the society was to be "The American Institute of the City of New York," and by the first article of the constitution its objects were declared to be, "to promote improvements in the mechanic arts, to encourage American industry in agriculture, manufactures and commerce, and to sustain such a system of policy as will protect the great national interests of our country."

The means by which the objects contemplated in this article of the constitution were proposed to be accomplished, were submitted, on the 11th of March following, by a committee appointed for that purpose, in the form of "An Address to the Public," which was signed by the president, vice-presidents and secretaries, and ordered to be published. In this address it is asserted that the members of the association "all entertain the same views in relation to the policy of encouraging and protecting our national industry," and that they believe "the most effectual service which can be rendered to that cause is the diffusion of a

more thorough and intimate knowledge of our national resources, agricultural, commercial and manufacturing." The address is a well-considered article in favor of a protective tariff, and assumes that national wealth and prosperity are sure to flow from the reciprocal action of these three great branches of national industry, whenever a proper legislative protection is given to the products of the manufactures of the country.

No plan of action was decided upon by the Institute for some months after its organization. A resolution of thanks "was voted to Daniel Webster, of Massachusetts, in the Senate of the United States," and others, "for their exertions to pass such acts as would encourage agriculture and manufactures, and for their persevering efforts to prevent the passage of laws which were calculated to impair the commercial and shipping interests of their fellow citizens." A publication committee was appointed "to give publicity to such facts, expositions and documents as are calculated to disseminate correct and useful information to the protecting an American system."

A committee was appointed to select such articles as had received the least protection from the tariff of duties, and to "ascertain their present as compared with former prices, in order to show that high duties on the foreign rival articles had uniformly reduced prices." The articles of hats, glass, leather, shoes, boots, cabinet wares, &c., were particularly recommended to the attention of the committee.

A committee of three persons from each ward of the city was appointed to extend the subscriptions of such newspapers published in the city, as advocate the American system.

A proposition to establish a weekly paper or periodical, devoted to the advocacy of a strongly protective tariff, was entertained and discussed.

It thus appears that at this time the main object contemplated by the founders of the Institute, was to aid in perfecting such a tariff of duties on imports as would give protection and encouragement to the industry of the country; and the means by which they proposed carrying out their views, were chiefly confined to the diffusion of statistical and other information.

On the 5th day of June, 1828, JOSEPH BLUNT, Esq., from the executive committee, made a report on the subject of a *Fair and Premiums*, which resulted in an exhibition of articles of American production, in the city of New York, under the auspices of

the Institute. It was held at Masonic Hall, in Broadway, and continued three days. No admission fee was charged, the expenses being borne by individual members.

The Institute at this time began to attract very considerable attention and was rapidly extending its influence and usefulness. Among the distinguished gentlemen admitted as members during *this* year, were Dr. Samuel L. Mitchell, Dr. Felix Pascalis, Dr. Samuel Akerly, and Henry Eckford, Esq., the celebrated ship builder.

Thus far the Institute was a mere voluntary association without legal existence, without definite views or system of action, and without revenue or income.

On the 2d day of May, in the year 1829, the Legislature of the State of New York created a corporation, under the name and style of "The American Institute of the city of New York," and declared the purpose for which it was instituted to be "the encouraging and promoting domestic industry in the State of New York and the United States in Agriculture, Commerce, Manufactures and the Arts, and any improvements made therein, by bestowing rewards and other benefits on those who shall make any such improvements or excel in any of the said branches, and by such other ways and means as to the said corporation shall appear to be most expedient."

It will be noticed that the objects contemplated by the charter were identical with those contained in the Constitution of the original association. The protective system was, it is true, still more obscured in the charter; but the phrase: "by such other ways and means," was at that time so well understood to mean tariff, that the Institute found no difficulty in giving to that subject all the weight which attached to its legal organization. The principle of a protective tariff has never, to this day, been yielded by the Institute. The addresses and orations at its annual fairs have generally—and frequently with great earnestness and marked ability—advocated and enforced the views of its early members on this subject.

There may be differences of opinion as to the benefits resulting from a strongly protective tariff, but there can be no question of the powerful influence which the Institute exerted in the early years of its existence upon the action of our Federal Legislature as well as upon public sentiment on this important question of national policy. There are even now many of its members who

believe that notwithstanding the benefits which the Institute has conferred on American manufactures by the direct and indirect influences of its fairs and other means, its exertions in the direction of a wisely arranged tariff of duties have done immensely more for the country than it has accomplished in all other ways besides.

But whatever course of action might have been most effectual in accomplishing the purposes of the Institute, it is certain that the *fairs* have absorbed more of its attention, and claimed a larger portion of its active labors than any other branch of its operations.

In projecting an exhibition of manufactured articles exclusively the product of American skill, the managers undoubtedly struck upon one of the most efficient means of stimulating the ingenuity of our countrymen that at that period could have been devised. Emulation and honorable competition thus brought into contact rapidly resulted in far greater perfection of workmanship, and speedily extended the number and variety of articles in the catalogue of American industrial products.

Fairs were known and held at Leipsic and Frankfort in Germany; at Lyons and St. Germain in France; in certain privileged towns in England; and in some of the oldest towns of German population in the State of Pennsylvania, and perhaps in some other parts of the United States; and also in the city of New York, for half a century and some of them for more than a century before the existence of the American Institute. But these fairs were generally held in markets or market places and were either meetings of buyers and sellers for trade, or were designed for amusement; and partook more of the character of carnivals than of places for scientific information or mechanical competition. It was reserved for the American Institute to bring together a grand collection of curious, useful, and unique articles, of exquisite workmanship, of novel designs, and frequently of startling efficiency, and to exhibit them in honorable rivalry and competition for such testimonials and prizes as the Institute should see proper to bestow upon the most meritorious of the exhibitors.

These fairs were established by skilful management and at the the expense of no small amount of labor. A liberal, but at the same time a just and discriminating policy of awards of diplomas and medals was adopted, and additional interest and effect were

given to the articles themselves by their scientific arrangement and artistic grouping in the theaters, castles and palaces selected for their exhibition.

It is true that the Society of Arts in London offered prizes for specimens of certain enumerated articles of British manufacture, and exhibited the products which were offered in competition, nearly a hundred years ago; and we believe that the Franklin Institute of Philadelphia, a short time previous to the holding of the first fair of this Institute did the same thing; but neither of these institutions entertained or contemplated any project on such a comprehensive scale as to challenge the whole industrial enterprize of their respective nations.

For the part which it has taken in this particular mode of fostering and encouraging American industry, the American Institute deserves the gratitude of the inventors and mechanics of the United States.

These annual exhibitions for some years after their establishment were quite successful and the results were entirely satisfactory. But it was found that it would not do to place too much reliance upon this single popular branch of its operations. Mr. Wakeman, the corresponding secretary, in one of his annual reports, "congratulated the Institute that the establishment of the *library* and *other means* had been successful in regaining public favor; that before these means were resorted to the exhibitions had reached their maximum, their novelty had ceased and there were palpable symptoms of their decline, and it was evident that something more was required to be done to give new life to the Institute." Mr. Wakeman proceeded to show that the means referred to as adopted by the Institute had restored public confidence, and that in three years after the establishment of a repository, &c., the fairs themselves instead of being in a manner stationary, a single one brought forth contributors with articles for exhibition in number and quantity more than three such fairs as preceded."

To the Fairs, then, were added a *Repository* and a *Scientific Library*. It appears that the Fairs could not have been sustained without the adoption of these other means. The Repository gave local interest to the Institute; the Library gave to it dignity and stability; and the Fairs, partaking of the general character of the institution under whose auspices they were held, were restored to their former popularity and usefulness.

The Repository at this time was one of the most interesting features of the Institute. In the year 1842, in their Report to the Legislature, the Trustees say that "a large and commodious room has daily been open to the public in the city of New York, called the *Repository of the American Institute*, a portion of which has been appropriated for exhibiting improvements in manufactures, labor-saving machines, models, &c., for the furtherance of agriculture and the arts, which has been the resort of vast numbers in quest of useful improvements."

And again in a memorial signed by General Talmadge, the President, I find that what was very properly called the Museum of the Institute, was at that time regarded as both useful and attractive. "The Repository," says the memorial, "has been for years a place of daily exhibition of models and machines, of specimens of art, invention and discovery, the resort of ingenious men and friends of improvement."

It is deeply to be regretted that the Repository which appears to have been so popular and to have given so much satisfaction should have been permitted to fall into neglect and disuse, and the valuable models and curious machines therein collected, to be scattered and lost, or given away.

Another important means adopted by the Institute for more fully carrying out the objects of its charter, was the establishment of a *Farmers' Club*. The amount of good accomplished by this Association is not easily estimated; besides the valuable practical information which is weekly conveyed to the public through the medium of this Club; it has, by conservative action, unquestionably prevented incalculable mischief. The errors and fallacies of learned theorists on agriculture, however plausibly presented, rarely fail to be detected and exposed by the good sense of some of the practical farmers who take part in the Club. I have no hesitation in saying that the learned and ingenious report on the subject of silk, and the culture of mulberry trees, which was submitted to the Institute and strongly endorsed by it, and which was followed by the ruinous and disastrous *Morus Multicaulis* speculations, could never have received the endorsement of the Institute if the subject had been submitted to the ordeal of a club of practical farmers such as now exists, and whose meetings are held in this hall.

Equally important as an operating branch of the Institute was, the establishment of a Board of manufactures, science and art,

under the direction and control of which was founded and is sustained the Mechanics' Club or *Polytechnic Association.* If this Association has not yet acquired such a reputation for science as to warrant the Institute in fully endorsing all its proceedings, or the public in giving ready and unqualified assent to all its conclusions, it is, nevertheless; safe to say, that the inventor of any machine, or the discoverer of anything new in the practical sciences, will always find in this Association an intelligent and learned, as well as a frank and honest body of earnest men, who will take as much pleasure in encouraging meritorious ingenuity as they will be prompt and uncompromising in exposing all kinds of charlatanism and ignorance.

In thus briefly noticing the general action and policy of the Institute from its commencement, it is plainly evident that its founders intended it to be progressive in its character. It has not thus far bound itself to any particular plan, nor trammelled itself by rules or promises of special performances, which it may not vary at any time when the interests of science may seem to demand a change. From time to time it has wisely acted upon new suggestions, and held itself in readiness to adopt anything which in its judgment might promise to accomplish the most beneficial results. What shall the Institute do this year? is a question that can always be best answered by the state of affairs and the position of things at the commencement of each season.

The rapid glance we have taken of its history, discloses on the part of the Institute a two-fold policy, one directed mainly to the sense of the public, the other more immediately to the intellectual and scientific instruction of its members; of the latter the Library, the Farmers' Club, and the Polytechnic Association have been the chief instruments; the Fairs, and the now neglected or abandoned Museum or Repository, have contributed the principal features of the former. From the Fairs, only, has there been derived any revenue, and experience shows that this source is precarious and uncertain; not only uncertain, but liable to involve the Institute in inconveniently large expenditures.

The subject of revenue is a practical one, and involves the entire interests of all the branches of the Institute. If the fairs are the chief reliance, and if such reliance proves uncertain, let such a change of policy be at once sought for as will meet the difficulty.

It has already been seen that the fairs of themselves, as mere

exhibitions, cannot be sustained. A successful fair must have a responsible and recognized scientific body to direct and sustain it, or the exhibition dwindles into a mere show. The tendency of any policy which would substantially restrict the action of the Institute to fairs would inevitably destroy the usefulness of the exhibitions themselves, and ultimately convert the American Institute into nothing more or less than a huge showman. A constantly repeated exhibition of essentially similar objects is not calculated to promote the cause of true industrial progress. These repetitions cease to interest the public, and in order to render the exhibition attractive, recourse must frequently be had to extraneous means, often quite at variance with the dignity of the Institute, and in the end calculated to retard rather than stimulate the progress of mechanical development.

Meritorious exhibitors and inventors do not enter their articles or products for the medal or prize as for so much silver or value. The medals and diplomas are contended for on account of their moral power. They carry with them the proof that the article exhibited had passed the ordeal of a body whose stamp and indorsement fix its standard of value. The fairs of the American Institute are valuable as promoters of American skill and industry, only in so far as the Institute has character and reputation thus to establish the comparative value of competing articles.

Impressed with these views, I submit that the time has arrived when it becomes the imperative duty of the Institute to aim at such a position, among the scientific bodies of the day, as will give to it, not only an elevated place, but such a distinctive recognized character as will challenge attention and respect, and will make it an acknowledged power throughout the land. Such a position it is in the power of the Institute to take. The learning and the means at its command justify the public in expecting it to take the first rank in those departments of science to which it gives its attention.

In order to the attainment of this end, I would respectfully suggest, as the result of my careful consideration of the subject, that,

I. It is a vital necessity that the Institute provide itself with a permanent and central location. To the want of ownership of a suitable building may unquestionably be attributed the abandonment of the repository, and the loss of many valuable models and machines.

There exists, in the Institute, a very great difference of opinion as to the proper site for a location. The rapid tendency to up-town residences seems to indicate the propriety of fixing upon some spot as far up as Fortieth street, the point which, in all probability, will become, within a few years, the centre of the more permanent resident population of the city; while it is obvious that the centre of mechanical business and the centre of transient population must continue for a long time, certainly for the next half century, below Grand street. An important fact in this relation must be borne in mind, that the up-town resident population is not what constitutes the best portion of the patronage of the Institute. The mechanical and mercantile community, with the strangers and business men who visit our city, are the principal contributors and paying patrons of the fairs. Nor must it be overlooked that Paterson, Newark, Jersey City and Brooklyn contribute nearly or quite as much to their support as the city of New York.

By excluding from the fairs much that has heretofore occupied space without adding to their interest or to their character, less ground space will be required. By a careful economy of room, and by the adoption of the most approved plans for the display galleries of the different stories of the building, it is possible that a space equivalent to six or eight lots of ground may be found sufficient for business purposes, for the ordinary annual fairs, for the library, the repository and the club rooms. Any revenue from rents, in addition to accommodating all the wants of the Institute, will depend entirely upon the location of the building. I have no confidence in the success of exhibitions remote from Broadway, the great metropolitan thoroughfare.

II. A location secured and proper accommodations provided, the Institute would be strengthened by the immediate re-estabment of a repository or museum, in which should be exhibited all such articles of American invention and manufacture, and such rare and valuable works of art and objects of natural history as may from time to time come into the possession of the Institute. Articles not the property of the Institute left on exhibition to be subject to a monthly charge according to the space and position which they occupy; thus in fact establishing a permanent exhibition.

III. An important service can be rendered to mechanical and professional enterprise by establishing, either in the museum or

in a distinct department, a cabinet of minerals, in which should be found specimens from every working mine on the continent, with a book of convenient arrangement for reference, containing the analysis of each specimen and the statistics of each mine.

IV. It is its peculiar province, and should therefore be promptly and fully met by the Institute, to furnish ample accommodations and facilities to inventors for fairly testing all new inventions, by placing at their service steam power both for heavy and light machinery, at the lowest remunerating rates.

V. The Institute needs a larger infusion of learned and practically scientific men among its members. This end would probably be easily accomplished if the measures I have proposed were adopted and energetically prosecuted.

VI. The Institute having proper lecture rooms in their own building would be able to arrange for weekly or daily scientific lectures for the benefit of members, and for annual courses of popular lectures for the public. The latter could be made a certain source of revenue.

VII. The foregoing suggestions imply a modification of the by-laws; any action on which, however, I would recommend to be deferred until after the trustees shall have reported upon the purchase of a new and permanent location. The change will, in my opinion, have to be radical.

THOMAS McELRATH.

AMERICAN INSTITUTE, *November* 1, 1860.

PROCEEDINGS OF THE FARMERS' CLUB.

The Report of the American Institute made to the Legislature in the year 1860, contains the proceedings of the Farmers' Club, up to and including the meeting of the 16th day of April, of that year.

On the 23d day of April, 1860, the Club convened at their usual place of meeting, at the rooms of the Institute in the Cooper building.

Present fifty members. Mr. E. Doughty, of New Jersey, in the chair.

Judge Meigs, the Secretary, opened the discussion with remarks upon the following important subject:

PRESERVING POTATOES WITH LIME.

He said: It has been proved by experiments made by shippers of potatoes from this city to San Francisco, that two quarts of powdered lime to a barrel of potatoes, placed on the top, so that it would sift through the contents, has a remarkable preservative effect upon the potatoes, entirely preventing the disease known as the potato rot. It also prevents the tubers from sprouting, and keeps them entirely sound, although they have to pass the equator twice on the voyage. The Secretary remarked that this fact was very important to masters of sea-going vessels upon long voyages.

THE PLANT APHIS.

The Secretary said that the aphis had made its appearance very early this year. The question is, did this insect secrete himself on the inside of the bud, and there become developed?

Andrew S. Fuller, gardener, thought the insect crept inside for shelter in cold, windy weather.

THE KIRTLAND RASPBERRY.

Wm. Lawton, of New Rochelle, distributed a large lot of the Kirtland raspberry, which originated in Ohio, and which is spoken of as quite hardy. These plants appeared sound, and Mr. L. stated that they stood out all winter in an exposed situation. The fruit ripened in June, and continued to yield for three weeks.

COOK'S FRUIT BASKET.

Mr. Fuller stated that the only objection that he had heard spoken of was, that the round shape of the basket prevented such close packing as could be got with the square boxes, but there was another objection which might be urged against them by some gardeners, and that is, that they are calculated to give honest measure. The baskets are made of exact measure, quarts and pints, and sold at $30 and $35 a thousand.

FLOWERING PLANTS IN ANCIENT TIMES.

Andrew S. Fuller, made the following interesting statement in regard to flowers in olden times. He said every season the catalogue of our most enterprising floriculturists abound with specialties just introduced to the public, and the flower-loving world are beginning to believe that the present is as far superior to the past in the product of the flower-garden as it is supposed to be in the arts and sciences. We are, in truth, becoming acquainted with new plants and new varieties every year, as our explorers penetrate unknown regions; and as Yankee enterprise secures commercial relations with countries heretofore exclusive, such as China and Japan, we are receiving and shall continue to receive from the rich floral stores of those countries plants now unknown among us. We are too apt, however, to place too much importance on new things, to the neglect of others, until they are so long neglected as to be almost forgotten, when somebody takes them up and heralds them as wonders. In an old book called the "Complete Florist," written by John Rea, in 1676, almost two hundred years ago, we find notices of many things that are to-day quite fashionable. We will not weary the Club by an extended recital of the list, but merely mention a few. Among the peonies we find Alba Peno, double white; Vulgaris, common double red; double striped; carnation. In the recent lists we find no double striped or variegated, and no white or carnation, whose description excels that given by Rea, although

prices range from $2 to $10 a plant. Double Rockets, or Hesperis, purple, white, and variegated, a good thing, common then, scarce now; Achillea Ptarmica, Pleno Alba, a dwarf trailing plant, with double flowers, very pretty, but seldom seen; Double Daisies, small Carnations, 500 choice named double varieties. Rea's mode of propagation is the same as now used, and his directions as good as anything to be found now; Double Lychnis, scarce now; Double Primroses, various styles and colors; Double Campanula, beautiful plants, scarce now at fifty cents; Anemone, wind flower; this plant, says Rea, is called by many gentlewomen, and others as ignorant, Robin Hood, Scarlet and John, Spanish Marygold, &c. We mention this only to show that the custom of calling plants by any name preferred was not approved 200 years ago. Gladeolas, white and red, several varieties, some snow-white, which are scarce now, selling as high as $5 each. Iris, 113 named varieties; one nurseryman who put 80 varieties in his catalogue last year, was hooted at for endeavoring to impose on the public. We gladly welcome any new plant or new variety but beg that our friends, in their love of the new, will not forget what is due to the old.

BOTANICAL, OR SCIENTIFIC NAMES.

A discussion ensued on the subject of calling our common plants by their true scientific names. Mr. Fuller contended that with our present facilities for intercourse with all the world, it was positively necessary to use no names but such as are universally known. As to planting flowers, he highly recommended the cultivation of hardy, perennial flowers, rather than so many annuals. For instance, the Phlox, taking into consideration all its varieties, will give an uninterrupted succession of flowers from spring till autumn.

Judge Meigs remarked that many of the scientific names were illustrative of the character of the plant.

PLANTS FOR THE NORTH SIDE OF A FENCE OR HOUSE.

Mr. Fuller gives the following list as suitable to plant on the north side of buildings, or in shady locations: Irish Ivy, Holly of different varieties, Rhododendrons, Ampelopsis tricolor, Myrtle varieties, Evergreen Euonymus, Pachysandria Procumbens, Daphne Gneorum.

R. S. Pardee.—I have been much pleased with a class of flowers known as *everlasting*. There are twelve sorts, giving a great

variety of colors. A good catalogue gives a short description of this sort of flowers. The one known by the French as the "*immortelle*," is a decided favorite with all who cultivate them. My mantleshelf has been garnished all winter with these everlasting flowers. Some of the new Dionthus are particularly worthy of notice. Some of these pinks open to the size of a silver dollar. They grow readily from the seed, which at present sells at very high prices for some of the rarest sorts. There is a new variety of the Clarkie that is a very superior flower; it also grows from the seed. The German asters grow in great variety; our only trouble is to know how to inquire for the right sort. Truffant's French asters give satisfaction where the more common sort would not.

The phlox, if cultivated in good soil, will shoot rapidly, and seed saved from these sport flowers will often give new and superior varieties. The only way to get satisfaction in buying flower seeds is to first learn exactly what you want. For instance, "phlox" is the name of a whole family of plants, and would not at all sugest the particular variety which the cultivator might desire to purchase. Mr. Pardee told an anecdote of how a village was improved in its appearance by the act of one little girl, who had a passionate love of flowers, and took great pains to introduce them into generel cultivation. Her influence was such that owners of dwellings not only planted flowers and ornamental plants, but as soon as they bloomed and showed their beauty, the owners began to paint their houses and fences, and in a few years there was a very great change in the appearance of the whole village, all growing out of such a small beginning as was made by this little girl.

Mr. Wm. Lawton spoke earnestly of the beneficial effects upon every community where flower cultivation is prevalent. He urged most earnestly the attention of all city residents who have a little spot of ground, as well as to all country residents, the importance to the rising generation of cultivating a love of flowers as great amelioration of character.

WILD FLOWERS AND PLANTS.

Andrew S. Fuller—If we had spent half the time and money upon some of our wild native flowers, that we have spent upon imported flowers, we should have had a much better assortment. There is the Phloxes and Lady Slippers of the western prairies, superior to any that we have ever imported. Besides, some of

the most costly ones that we import were originated from American plants, by seedlings. There is a great neglect of our native varieties of flowers, and ornamental trees and shrubs.

Mr. Moody, of New Jersey, said that the fault was with the nurserymen, who did not use their power to introduce the native varieties. He thought the common black cap raspberry superior for cultivation, on account of its hardiness and other good qualities. He contended that nurserymen give character to the plants and flowers that are cultivated, and there is a fashion in what we cultivate as well as in what we wear.

A VALUABLE LIST OF ORNAMENTAL PLANTS.

Mr. Fuller furnished the Club with the following list of ornamental plants, viz :

Wiegelia Rosea, Spiraca Reevesii pleno, Spiraca Prunifolia pleno, Spiraca Fortunii, Spiraca Douglassii, Calycanthus Pyrus Japonica, Deutzia Scabia. Deutzia Grasselas, Rhus Cotinus, Amygdalis rubra, Philadelphicus Coronarius, Philadelphicus Sanguinea, Halesia Dipteria, Forsythia Viridissima, Altheas, different varieties.

Adjourned.

HENRY MEIGS, *Secretary.*

April 30, 1860.

Present—45 members. Mr. R. L. Pell in the chair.

The Secretary read the following translations and extracts made by him from the journals and papers from abroad and home, received by the Institute since the last meeting:

INSECTICIDE.

Mons. Rodiguet gave the details of the insecticide properties of the great Margaret (*Chrysanthemum-Cacanthemum*), white flower Margaret, when used in decoction, to kill insects.

COFFEE TREE.

Doctor Montague gave notice that the coffee trees of Ceylon and of the West Indies are attacked by the same oidium, or fungus, or mushroom (*Triposporium Gardneri*), an insect also. And the insect and fungus act as a double cause on the Olive. The leaves of the Mulberry are also diseased.

Mons. Guerin-Meneville remarked that some years ago he had received from the Baron de Delmar, branches of the coffee tree of Ceylon. They were decayed—but showed the black fungus (*Cryptogame*) and numerous insects resembling the cochineal. He said—as to the disease of the Olive, which he had studied at Villefranche, near Nice—that the attacks of insects and fungi are caused by the abundant secretion on the branches of a kind of sugar which attracts the insects of various species, and the black disease appears there next year.

Prof. Cloynet had noticed on his domains the *Malgue*—used lime water and cured it; as also the *white malady* on his fig trees.

The Count de Fontenay said he had used milk of lime, mixed with purin (a liquid from many manures), on potatoes early in the season and the crop was sound.

[The coffee tree, originally from Arabia, was not introduced until about 1707—first to France, where the botanist, Commelin, nursed it in a conservatory in Amsterdam. It was placed as a curiosity in the *Jardin des Plantes*. Reston, a lieutenant of artillery, had one and gave it to the Royal Garden. De Clieu, lieutenant of the King of the Martinique, carried two of the trees there, one of which died on the passage. Fresh water being scarce at sea, De Clieu divided his allowance of water with his little coffee and planted it in his garden at Preschem. From this descended all the coffee trees of the West Indies. Thus one seed enriches a nation! We ought to sow seeds of Mocha coffee.]

COTTON.

Our famous Sea Island cotton originated in the West Indies.

SUGAR CANE.

In 1780 the sugar cane of Otaheite, of the Pacific Ocean, was introduced into the West Indies, and being better, it displaced all the Creole cane before existing there, and the crop of sugar doubled.

SILK WORM.

Great efforts are being made to cure them of disease. The *Ailanthus* seems to grow in favor as feed. Yet in this country the leaves of this tree are not touched by insects!

Silk worms are fed partly on teazle leaves, the Japan varnish tree, the palma christi, some oaks, apricot, willow, chicory, lettuce, lilac, snow-ball and branch cabbage, called cavalier cabbage.

Flattering experiments are made on growing the white nettle of China, for its fibre. The plant grows tall, is planted close, and yields annually a valuable sort of flax.

FISH SPAWN.

The coast of China, Algeria, and Morocco, at the spawning season, are found in calm weather full of spawn and boats and sold for food and manure. Much is consumed in Chinese junks. In places among the shores of the Mediterranean the spawn is salted and sold, and cooked in a variety of ways.

POULTRY.

The so-called Cochin-china fowls (falsely), come from Nankin, in the Province of Tche-kiang, the chief city of which is Hang-tchow (city of flowers, opulence, luxury and pleasure.) It is the terrestial paradise of the Chinese. Nankin, which grows the remarkable cotton of that name, and the eggs of these fowls being always of that Nankin color, we give them the more suitable name of *Nankin Fowls*. This name was adopted on the motion of Vice-Admiral Cecille, who brought them to the Museum of Natural History in 1846.

William S. Carpenter.—All classes of insects have their favorite plants, but when those fail they will take to others. Last year I saw the Ailanthus (usually free from all insects,) com pletely covered with a worm known in our country as the canker worm. Those trees were wholly stripped of their foliage. We are continually importing insects in various ways. I am told that every banana stem contains a worm, and some of the same sort of worms have been discovered preying on the quince.

R. G. Pardee.—I wish every man would try the solution of aloes—two ounces to the gallon of water. It is such a bitter vegetable that it is offensive to all insects. It may be used just as strong as it can be made—from one-fourth to a whole pound to the gallon.

ROSE SLUGS.

Mr. Carpenter said, the slug is easily killed by hand in the after part of the day, by an application of quassia decoction, sprinkled upon the leaves, as the slugs are then on the upper surface.

SQUASH BUGS.

Extra cultivation, by which the plants grow rapidly, is the best remedy for these pests.

Mr. Garvey.—I have tried a great many remedies, and have never found anything so good as careful watering, and killing the bugs.

BARK LICE.

Andrew S. Fuller.—If a tree is properly cultivated, it will grow so vigorously that it outgrows all bad effects from attacks of plant lice.

WATERMELONS.

Mr. Carpenter.—I am very successful in growing watermelons. I dig a hole three feet wide and three feet deep or more, and fill it with cowyard manure, early in the season—say 1st of May, and cover this with light soil, six or eight inches deep, before planting the seeds. For muskmelons I manure with well decomposed manure, sown broadcast and worked into the soil. I would also work in a little of this fine manure in the top of the watermelon hills.

BUGS.

Mr. Fuller.—I have tried all sorts of remedies, and all failed. Sometimes a decoction of tansy has the effect. Whale oil soap has been highly recommended. I have tried that most thoroughly, but without effect.

INSECT DESTROYERS.

The Chairman stated that he had sent to Europe for a supply of the ichneumon fly, which he hopes will prey upon the wheat midge, and eventually drive that pest from the country.

Mr. Fuller remarked that the only chance to get rid of the curculio will be by some insect that will destroy the other.

AMERICAN GUANO.

A discussion arose upon the value of this kind of guano, but no satisfactory results were elicited. The Chairman said that he would not recommend any one to use Peruvian guano except in a liquid form. If it is used dry, and a dry time follows, the guano will do more harm than good. The value of liquid manure in England has been fully proved. I would make the liquefaction of guano very weak. So I would any other substance. It cannot be in too weak a solution.

Mr. Carpenter.—I have found Peruvian guano, 250 pounds per acre, sown broadcast, a very valuable fertilizer for corn. It hastens the ripening, as well as gives a better yield of grain. Upon

small grain I have found guano produces a great growth of straw, but not of grain. I would not use it in very large quantities. I have not derived much benefit from the use of American guano.

CULTIVATION OF FLOWERS.

This question was now called up, and Andrew S. Fuller requested to give the Club some information from his great store of practical knowledge.

CARNATIONS.

Mr. Fuller made the following remarks upon this branch of the question:

The Carnation belongs to the genus Dianthus—the name Dianthus is derived from two words—first, Dios, the Greek name for Jupiter, and Anthos, a flower.

There are many varieties and species of the Dianthus: some of them are natives of this country, some of China, and others from Europe—in fact, nearly every portion of the temperate zone has its species of this plant. But the Carnation or Dianthus Carephyllus is supposed to have been introduced into France and England from Italy, and thence to America. At the present time its cultivation is carried to the highest state of perfection in France, Germany, and some parts of Holland.

The Carnation class of the Dianthus is divided by florists at the present time into several classes, snch as Flake, Bizarre, and Picotee. The meaning of the word Flake is well known to be a stripe or spot on the petal of the flower. Bizarre is a word borrowed from the French, implying whimsical or fantastical in colors. Picotee is also a French word, and signifies spotted; hence "la Carnation Picotee" means Spotted Carnation.

The excellency of a Carnation is estimated by the brightness and distinctness of its colors, and also the formation or construction of the flower. If it is a striped flower, the stripes should run longitudinally through the petal, and each petal in the flower should be striped.

If the flower is of one color, or self, as they are designated, it should be pure and bright, the form round, and the edges of the petals smooth, and not indented. The flower should be sufficiently double to form a slight crown in the center.

The calyx must remain entire after the flower is open and not burst open, as is the case with many of our new monthly carnations. If the calyx or cup, is sufficiently long, (say one inch or more), this will be avoided. The flower stalk must be strong, straight, and elastic to support the blossoms firmly, although they will require a stake to hold up the main portion of the plant.

As the flowers of different colors often possess a different fragrance, as the red or purple gives us more of the clove scent than the lighter colors, each may choose to suit their fancy; yet all impart in a greater or less degree the peculiar fragrance which is always agreeable.

The Carnation produces seed in this climate very sparingly, but we can assist it very much by planting it in proper soils, and by covering or partially shading the flower from the scorching rays of the midday sun; also, by plucking out a few of the center petals of the flower when it first opens, and thereby allowing the organs of reproduction an opportunity of proper development. The proper soil in which to sow the seed or grow the plants is a rich sandy loam, and unless some pains be taken to procure such soils, we need not expect success. Sods cut from an old pasture or the road-side, and put in heaps until well rotted will be found a congenial and suitable soil for this plant. But it should never be used until it is thoroughly decomposed, and this is easily accomplished by turning over the heap several times during the season. If the soil from which the sods are taken is naturally poor, then a little old manure may be added when the heap is made.

Emmerton says that the grand art in gardening is to know when there is deficiency or redundancy of any of those primitive soils in the mold you are going to make use of, and to be able to mix and regulate it so as to suit the nature and wants of the plant you intend to set in it.

There are many people who, from want of thought or observation, imagine that because a plant is set in the earth it must thrive in it—exposed in all weathers, wet or dry, hot or cold, whether it be tender or hardy, indigenous or exotic; whether it be native of the mountains or an offspring of the valley—never considering that different plants require different soils, as well as different aspects and climates. Some require strong soils, others light; some like to bask in the sun, others thrive best in the shade

some will stand a flood of rain, while others again require moisture only occasionally; from which it is pretty evident that one general system of culture for every plant can be neither right nor proper. To mix, temper, and harmonize different soils, so as to form one suitable to each plant, to know its peculiar situation and proper treatment, its best mode of propagation, &c., is what shows and distinguishes the skillful and experienced gardener.

Mr. Fuller also exhibited several specimens of new flowers of Carnations, and explained why they were not worth cultivation: because the flowers are known as "bursters." He also gave a little history of some native kinds, and compared them with those imported from China. A good pink shows a smooth, round head form, as well as good color. In planting pink seed, make the soil very fine, soft and light, and after the seed is sown sift the dirt over the seed. You only need a covering a quarter of an inch deep. This seed bed should be shaded in hot, sunny weather. When the plants are big enough, transplant them to stand a foot and a half apart, and cover the plants with straw in winter, not so much to protect it from the cold as from the sun and from freezing and thawing. Pinks are propagated the third year from the seed by layering.

FLOWER SEEDS.

Some are improved by keeping. For instance, the balsams, or "lady slippers." Verbena seed keep poorly. Most seeds do not keep well more than one year. Carnation seed does not keep well. Verbena seed must be collected by casting off the head before it withers, or watch and gather the seed every morning.

FLOWERING CURRANTS.

In answer to a lady's question, Mr. Fuller stated that flowering currants will grow from slips. The hydrangia is hardy, as a general thing, and does not require housing in winter.

ORNAMENTAL VINES.

In answer to another question, Mr. Fuller said the trumpet creeper (Tecoma radicans) and Virginia creeper are both good and hardy. The Wistaria is also a good, hardy climber.

BUYING PLANTS IN BLOOM.

Solon Robinson.—Please accept from me this word of good advice about buying plants while in bloom. Many people are

tempted by the display of beautiful flowers, seen at this season in our market places, to buy the plants for cultivation, in the expectation of being able to reproduce the same sort of flowers in their gardens or parlor windows. Ninety-nine of every hundred such purchasers will meet with disappointment. Such plants never reproduce such flowers, simply because these are hot-house productions, got up to sell; and the beauty of their beautiful bloom effects the object, and answers the purpose of the producers, and that is all they care for. They do not expect them to reproduce the same beauty. If they did, it would spoil the trade. It is all well enough for the admirers of flowers to buy the hot-house productions, to gratify their love for the moment; but really, these flowers in pots are of very little more value to you for future use than a bunch of flowers done up in a bouquet. The buying of these plants, and the attempts and failures to reproduce the flowers, do much to discourage the cultivation of flowering plants. It would be much more satisfactory to expend the same sum of money that you would in buying the plants in bloom, for a good assortment of flower seeds. There is no difficulty in getting them anywhere that the mail travels, in a letter. If you will buy plants, instead of seeds, go to an honest gardener, and tell him what you want, or what result you want to produce, and what sort of a situation you have to produce it in, and he will give you a plant that will give satisfaction.

Mr. Fuller corroborated this statement. He said that the people of this city throw away $100,000 annually in buying these hot-house plants while in bloom. The market is now full of the most beautiful roses, which sell at double the price of plants not in bloom, and yet they are all a loss to the purchasers; they never grow and bloom again to satisfaction.

Mr. Thompson, of Williamsburgh said that he had found another difficulty in buying these hot-house plants, and that is the insects that he got in the pots.

Mr. Pardee remarked that we could not get some of the bedding plants, such as verbenas, except we get them in pots.

Mr. Fuller.—I do not object to buying a few small house plants, or bedding plants in pots, but those should not be bought in bloom. I do object to the practice of selling everything in bloom, forced by hot-house culture, to people who will plant them in open ground.

Mr. Moody, of New Jersey, thought that here in the city we

may buy such plants and enjoy them while in bloom, even if we do not succeed afterward. We may sometimes make a selection while in bloom that we should never become acquainted with if we waited to buy and grow the plants till they bloomed in our own gardens. If there is enjoyment in buying these evanescent things, let us have the enjoyment while we may. It is well to tell us why we fail to reproduce the same kind of flowers.

Mr. Roberts had remarked a species of naked worm feeding on the ailanthus.

Mr. Carpenter.—Our old fashioned hairy caterpillar has partially disappeared.

Mr. Meigs.—Science applied to agriculture is of vast value, but the weather governs, and so do such unknown causes as *potato* rot, which like *cholera* acts without *one idea* of its true character being yet elicited! One hill of corn never yet yielded any *two stalks alike*, anymore than two *blades of grass!* From seed time to harvest, the farmer knows not what a day can bring forth on his farm! *No two square yards on a farm are equally suited to all plants!* I found in mine a place peculiarly adapted to each plant. When I finally discovered a place for my celery nursery—the plants grew four times better than before. It was in partial shade. The north side of fence, house, barn, and where the plants could receive morning and evening sun, but never *noonday* sun.

Subject for next meeting, "Spring planting and fruits."

Adjourned to May 7.

H. MEIGS, *Secretary.*

May 7, 1860.

Present 60 members—Mr. Wm. S. Carpenter in the chair.

Judge Meigs.—In 1670, Long Island is described by Denton and others as then being a natural garden, visited by parties (now called picnics) to enjoy its wild fruits and flowers. Strawberries grew there all over it in *profuse abundance*, and several kinds of grapes in every direction, and excellent too. This was the first *Vinland* (land of the grape vine) visited by the Northmen ages ago. The historian Vanderdonk, of Antwerp, in 1650, mentions it. The whole country on this island and about New York as full of many kinds of grapes of excellent and lovely character.

Verazzono, who was here nearly 400 years ago, said that he found the trees hung with grape vines as they are in Lombardy;

that he saw wild roses, violets, lilies, and many fragrant flowers, unknown and different from those of Europe; that some people had cleared away shrubbery about the grape vines to let them grow the better.

Mr. Carpenter read the following letter on slate roofing, from Geo. N. Bates, agent of the Empire Slate Co.

ROOFS OF SLATE.

Slate roofs for farm buildings can be obtained at Middle Granville, N. Y., at $2.25 a square, and the freight to New York will make the cost less than $6 a square. A slate roof is not only as easily laid as shingles, but will last longer than the building, unless it burns, and then its effect is often to dampen the fire so as to prevent its extending to other buildings. The paper also states the following facts, interesting to farmers:

"The slate produced from this quarry is as good as the best Welsh slate; it is entirely free from grit, and can be planed as smooth as a board; is very flexible, and not liable to crack; is used for roofing, flooring and mantles. The slate is of three colors—purple, green, and black. It is worked out, ready to put on the roof, in seventeen different sizes, the largest size being 24 by 16. The slate can be laid on a roof with one-quarter rise—that is, a roof twenty feet long will require five feet rise; this insures a tight roof, when put on close-laid plank or roofing boards, but where it is only ribbed, mortar is used in the joints. The slate may be laid flat as a tin roof, by using white lead to the joints. The slate should be laid so as to present three thicknesses at the butts. It is believed this is the cheapest roof that farmers can use, as it can be put on in the very best manner for about $6 per square of ten feet. They also furnish a cheaper slate, such as are a little rough, mixed in color, &c. This second price can be put on a roof at a cost not exceeding $5 per square—making quite as good a roof for out-buildings."

Dr. Trimble.—The slate which I mentioned, on a roof at Philadelphia, at a former meeting, comes from a Pennsylvania quarry. The roof is very flat; the slate is laid upon ribs, in cement, and is found perfectly tight, and greatly to be preferred to an iron roof. In fact, iron roofs are in a great measure condemned in Philadelphia. This slate roof was adopted after a great deal of inquiry and experiment. There is an inexhaustible supply of slate in this country, of the very best quality.

LIME, SALT, PLASTER, ASHES, FOR POTATOES.

Solon Robinson.—O. C. Waitt writes from West Georgia, Vt., for more explicit directions about the application of lime, salt, plaster, and ashes, to potatoes. He asks:

"1. Do any of these lose their virtue by mixing?

"2. Will the composition injure the young vines if applied directly to them?

"3. Which and how many of these are adapted to dry, sandy or clayey soils?

"4. And which to moist, tenacious ones?

"5. How many of the above manures are profitably mixed with manure from the poultry-house for a top-dressing on corn, or to be used in the hill?

"6. To what extent may hot suds, or ley be applied to apple and pear trees, without injury, or what degree of heat? We should not accept that statement, except upon the undoubted authority of the Farmers' Club. Had boiling water been prescribed to apply to cattle, we should not have been more surprised. We are much indebted to the Farmers' Club for important information; may they not only prescribe for our infirmities the kind of remedy, but the manner of application."

I will give brief answers, according to my opinion, to these questions, and will report those of other members, if different from mine.

I. These ingredients may be mixed in any proportion convenient; but the best way to mix salt and lime is first to saturate salt with water, and then slack lime with the brine, and keep it in a conical heap under cover until efflorescence takes place, and then from time to time rake off the powder formed and put it in casks, until all the lime is reduced to that condition which is called *chloride of lime*, which, with the *carbonate of soda* formed by the operation, will be found always beneficial to land that is full of vegetable, fibrous matter, and the best thing in the world to decompose muck. Oyster shell lime is best, or stone lime free from magnesia. It will take one bushel of salt to three bushels of hot lime. This composition may be mixed with plaster and ashes, but I would not do it. I would sow it broadcast upon inverted sod, and harrow in before planting potatoes or corn, and at the rate of quantity that would give about three bushels of salt to an acre. The ashes I would apply a handful to a hill around the plants, not on them, as soon as up, so as to show the

rows plainly. The plaster I would apyly directly on the corn or potato plants, a gill to a half pint to a hill when a few inches or a foot high.

II. This question is mainly answered under the first. Ashes, or lime, or salt, applied strong to young plants will injure them, and some of the tender sort would be killed.

III. Ashes and plaster are, as a general rule, always valuable on sandy land.

IV. The lime and salt are generally good for moist and mucky soils.

V. Of the four named ingredients, plaster only can be profitably mixed with poultry-house manure, unless the lime and salt mixture has been used to decompose muck, and then that may be applied to the droppings of hens with more profit than anything else. You may profitably mix dry muck, decomposed sods, loamy soil, or charcoal dust with any strong-scented manure, but never mix lime, nor ashes, nor salt. Plaster (sulphate of lime), or chloride of lime, or sulphate of iron are valuable substances to use upon anything that has a strong odor to absorb and retain it in the manure heap.

VI. Hot water, or even hot ley, may be applied to trees enough to cook all the worms within reach. To try an experiment, take an egg and lay it on the ground at the root of a peach tree, and then pour boiling water from a tea kettle long enough to cook the egg equal to boiling it three minutes, and if it injures the tree, please report the case to me, and I will lay it before the club. As to applying hot water to cattle, that may be done without injury, and much to their benefit if they are infested with grubs in the back. Take a common lamp-filler of boiling water and apply the small nozzle right to the orifice over the grub and pour a little, and he will be cooked, and the spot will soon heal up.

Dr. Trimble, of New Jersey—I have never found anything so certain and easy as the knife to kill worms in peach trees.

The Chairman—If the worm is deep in, it will require so much cutting that it will do about as much damage as the worm. The crooked wire used by some fails with me in some cases. I cannot always follow the insect.

CORN PLANTING.

The Chairman stated that he finds a good deal of early planted corn will not come up. It was planted too deep. He said—I

would not put my seed corn over an inch deep, particularly early in the season. I object to planting any seeds deep.

ASPARAGUS.

I do not plant asparagus deep as most persons do. I trench deep, and put the roots only a little under the surface. I only cut the green part of asparagus. The white part is unfit to eat.

Prof. Renwick.—I am of opinion that we grow two varieties of asparagus. Some of it appears to grow all white, and others all green. The white variety is all tender, but the white part of green asparagus is tough and bitter.

Dr. Trimble.—I always prefer the white asparagus, but was not aware that there were two distinct varieties.

Prof. Renwick.—We have wild asparagus in this country that always grows green.

Mr. Fuller.—We have two distinct varieties of aparagus, and several sub-varieties. The green variety should never be cut below the ground, but broken off at the surface, for none but the green part will cook tender. But the white sort is tender and may be cut close down to the crown of the root. In planting an asparagus bed, never use old roots, such as are sold in our markets, dug up from old worn out beds. I would only use roots two years from the seeds.

Dr. Trimble.—I have seen an asparagus bed made in 1776, which was a few years ago in perfect condition, and used to furnish cuttings for market. I also knew a bed that was covered over deep to make it produce white cuttings, and it killed the roots.

Prof. Renwick also spoke of some very old beds in this city, where Tenth street is now located. These beds were some three hundred feet long, and one hundred feet wide.

NEW ZEALAND SPINACH.

Last year a plant was brought forward here as a new thing, called New Zealand spinach. I find that it was discovered in 1770, by Capt. Cook, and that it was not a new thing in England in 1821.

EVERGREENS.

The Chairman stated that he would never plant evergreens again in autumn. Late spring planting for all evergreens is the best in this section. The last winter, though not a cold one,

was a hard one for trees. I would prefer planting evergreens in August to October.

At the next meeting the domestic wine question will be introduced, with specimens.

H. MEIGS, *Secretary.*

May 14, 1860.

Present, fifty members. W. S. Carpenter in the chair.

The Secretary read the following:

TO CLEAN KNIVES, &C.

Cut off a piece from a potato, dip the cut end in brick dust and you have one of the best cleaners.

CHINESE YAM—DIOSCOREA BATATAS.

It is recommended to plant extensively in our vast plains and prairies, for it will take care of itself, defies cold, is excellent food where occasionally no other can be had.

A French chemist uses filters instead of churns, a bag of white felt or sheeting, resembling somewhat a soldier's fatigue cap, only longer and deeper—from each corner a porous string (wicking is best,) makes the outlet for the watery part of the cream. The bag is suspended by it's four corners firmly extended. In twenty-four to thirty hours there remains pure cream only in the bag, as thick as what the Americans call "smearcase," (almost cheese.) This solidified cream is then put into a strong linen bag, tied tight, so as to bear kneading like dough, without escaping. In a few moments the splash of fluid will be heard from the bag; the butter is made, taken out, the buttermilk remaining in it washed out. Perfect butter, and all of it remains.

The Rev. and learned Dr. Adamson, of Cape Town, sends us the following:

GOVERNMENT NOTICE.—NO. 476, 1859.

COLONIAL OFFICE, CAPE OF GOOD HOPE,
December 29, 1859.

His Excellency the Lieutenant-Governor has directed the publication of the annexed correspondence with the Colonial Botanist, upon the nature, extent, and cause of the disease which has appeared in the vineyards in the neighborhood of Cape Town; and he invites the attention of the proprietors of vineyards on the subject, and the co-operation in the formation of committees

for investigating the condition of the vines, and assisting the further inquiries of the Colonial Botanist.

By command of his Excellency the Lieut. Governor, administering the Government.

RAWSON W. RAWSON, *Colonial Secretary.*

CAPE TOWN, *December* 28, 1859.

The Hon. RAWSON W. RAWSON, Esq., *Secretary to Government:*

SIR—A disease having appeared amongst the vines in the neighborhood of Cape Town, I made it a point to investigate the matter, and to inquire into the nature, extent, and cause of the distemper. With this view I inspected the principal vineyards in our immediate vicinity. In some of them great mischief had been done, the muscadel and hanepoot grapes having been injured seriously by an attack of blight, whilst other varieties had either remained free, or suffered less.

On examination, I found that vines growing on rising ground, and where there was a natural drain, and no clay for immediate subsoil, were little smitten by the disease; while the crops of those which grew in level localities, and upon clay, were nearly altogether destroyed. Vines, also, which were exposed to the influence of the damp north-westerly wind, though sheltered by trees, were greatly affected. However the malady appeared to have come to a crisis, for the stems and roots were perfectly healthy, and the young shoots, which sprung up from all sides, even from much injured plants, were perfectly vigorous.

Having carefully and minutely examined specimens grown in different places, I could detect in none of them the slightest trace of fungus vegetation; and I ascribe the blight or rust, as it is called, to the uncommon long-continued heavy rains, which fell during the later months of the year, the damp atmosphere prevailing at that time, and the nature of the subsoil, which, in most localities, consists of stiff, impervious clay. The vineyards of Constantia, which have a sloping ground, and the soil of which consists of sandy gravel, appear to have escaped the disorder.

Under similar circumstances, the blight attacks other plants as well as the vine; for I found it likewise on peach and mulberry trees. It has been observed, besides, on former occasions, though perhaps, in a much milder form in our vineyards. The late Hon. M. Van Breda, an experienced and intelligent agriculturist, has left a diary, from which it appears that a similar disease of the

vine, showed itself in 1819, exactly forty years ago: "Rains had fallen but sparingly in the autumn and during the first winter months, when, from the 21st of July of that year, heavy and repeated rains drenched the ground, and made all springs to overflow; these rains lasting, at intervals, till late in the year. On the 13th of December, he observed the first symptoms of rust, which, during a whole month, spread among his vines, and caused great damage to the muscadel and hanepoot grapes, affecting the Steendruif in a slighter degree."

I have since visited most of the vineyards at Hottentot's Holland, where the blight has injured the vines to a fearful extent, by annihilating great portions of the crops. At some farms, all sorts have been smitten, but the muscadel and hanepoot nearly everywhere; the only place which has been spared hitherto being that of Mr. H. Theunissen's, whose vines grow on a slope, and have gravel for their soil.

I am very sorry, however, to have to report that amongst the lacrima christi grapes, on Mr. P. Myburg's estate, I met with the true vine-mildew, which had been observed there but a few days previous to my arrival, upon a few individual shrubs. The very existence (however limited) of a disease, which is known to spread, at times, with fatal velocity, deserves the utmost vigilance and attention; and the following remarks are results of my microscopical investigations on this important subject:

To the naked eye, the vine-mildew (*Oidium Tuckeri*), presents itself in a form of a byssaceous mould, which covers the stalks, leaves, and grapes, with a white powdery substance, and imparts a disagreeable musty odor to the parts. It is particularly visible on the pedicels, and upon the surface of the fruit; less on both sides of the leaves, and shoots.

When examined under a microscope of high power, very minute whitish-grey spots appear upon the cuticle. At first, these specks are solitary, and scattered here and there over the surface, but they soon become more or less united, and assume a. cloudy appearance. They then consist of a conglomeration of very delicate articulated, white threads, which interlace each other, and spread rapidly in all directions over the surface of the plant. These threads constitute the spawn (*mycelium*), and from them spring the fungi in the shape of minute, erect, fertile, club-shaped filaments. The latter bodies, which are scarcely the eighth part of a line high, are made up of a number of cells, separated by

transverse partitions. The lowest of these taper into a filiform stalk, while the upper ones are gradually thickening towards the top, where they become egg-shaped, and consist of spore cases, which are filled with a great number of extremely small ovate white spores or seeds, swimming as it were, in a limpid, gelatinous juice.

The cells of the parasite and its sporidia are perfectly transparent in their middle, but opaque at the margins. At first, the extreme cell only becomes ovoid, but in the progress of growth those beneath it acquire the same form, and then the entire fungus represents a necklace or chain. Very often, too, and particularly on the pedicels, and at the base of the berries (where the fungi grow more gregariously), additional sporidia spring in the shape of clusters from the site of the intermediate and terminal cells.

At the slightest touch or commotion the sporidia separate from the filaments either singly or in heaps of three or four, and are carried by the winds to plants hitherto uninfected, or scattered upon the cuticle below, where they commence germinating, by throwing off from one or both extremities, slender creeping threads, which in their turn become the spawn of fresh parasites.

All portions of the epidermis attacked by the oidium lose their natural aspect; they get discolored, and through the destruction of the superficial cells or the parenthyma small lurid specks are produced, which become confluent, and cover part of the cuticle with yellowish-brown irregular spots.

To account for the proximate cause of the malady is as yet difficult, it having made its appearance in a few localities and on some particular kinds of the grape only, though all of them have been exposed to the same meteorological condition. It may be that some varieties are more susceptible than others for the infection, but while this must remain hypothetical for a while, no precautions should be omitted, and no means left untried in order to arrest the progress of the plague.

Powdered sulphur, and strong decoctions of tobacco leaves have been recommended by various authors, but the application of the former on an extensive scale seems impracticable, while the latter, a vegetable substance,. may be liable to fungoid destruction itself. It strikes me, however, that a weak solution of chloride of lime may be of use, and could easily be experi-

mented upon. This preparation, which is well known to counteract decay, is not only cheap, but could be applied by means of watering-pots or garden spouts at little expense, the bleaching power of the chlorine in the combination with lime in a sufficiently diluted state, being hardly to be feared.

LABELS FOR FRUIT TREES.

Prof. Mapes.—Take two pieces of wood, hinged together with a leaden wire, with the name between the two. The lead wire is preferable to all others. The cost is not over fifty cénts a hundred. Zinc labels, written over with a lead pencil, makes a durable label. If written upon with any acid ink, it will eat the name into the zinc.

THE LOCUST.

Prof. Mapes stated, that in plowing upon his farm, near Newark, on Saturday, the seventeen-year locusts were turned up in vast quantities.

Dr. Trimble stated that this insect does not consume vegetation. They are within a few inches of the surface, waiting for the right condition of the temperature to issue forth. Seventeen years ago these insects came forth on the 25th of May, and immediately commenced their musical notes. They remain about six weeks above ground, eating nothing. The injury they do vegetation is by puncturing the limbs to deposit their eggs; this kills the ends of the branches. The apple tree and elm trees are favorite trees with these seventeen-year locusts. The time of their appearance varies in different localities. This is the year for all this vicinity and up the Hudson river. My opinion is that the life of the insect is sustained under ground by attaching to the roots of plants. The limb selected for puncture is always small.

Prof. Mapes thought that these fellows would be a little too much for "insect powder." Still he had received great benefit from one called the "Persian powder." That will enable me to grow early turnips, and it will kill caterpillars.

Mr. Gale—In 1809, in Orange county, the locusts were plentiful enough to allow me to gather bushels of them, and the apple trees were covered. The only injury was to the small twigs. Wheat fields were covered, but not injured.

Andrew S. Fuller—In 1855 the locusts were very abundant in Illinois, and came forth out of heavy clay land, from more than

four feet deep, in oak forests. They appeared to prefer the oak trees.

The Chairman stated that he had observed their preference for oak in some instances, but upon the whole he thought they had very little care for any particular sort of trees.

Dr. Trimble thought the chestnut was their favorite.

DOMESTIC WINES.

Prof. Mapes—The decoction usually made, and called currant wine, is not wine; it is fruit juice and alcohol; then came sugar, forming alcohol in its fermentation. None but refined sugar should be used, and if a spoonful of sulphuric acid should be added to five gallons of syrup, it will in a measure convert it into grape sugar. If you put 16 gallons of the juice of rhubarb into a cask, and then add three pounds of refined sugar to each gallon of the capacity of the cask, and fill up with water, and mix well, it will ferment and make what is called wine. In about eight weeks it will cease to ferment, and then it should be corked tight and kept one year without touching it before bottling. In three years it will become like a dry sherry wine. The sugar used for all fruit wines should be what is called triple refined. If any spirits are used in small fruit wine, it must be pure spirit without any taste. This is better than brandy for preserving fruit.

I don't believe that grapes grown in this vicinity will make wine without sugar, and then it is not wine, it is grape cordial. The only remedy is to dry the grapes before making them into wine. I believe I can make 150 barrels per acre of rhubarb wine, and it will be better than the most of the grape wine yet made in this country. One of my neighbors makes wine of perfectly sound cider, one year old, by dropping Isabella grapes into the bunghole until the barrel is full, and left to stand six months.

CINCINNATI GRAPE-VINES.

Andrew S. Fuller presented samples of grape-vines from Cincinnati, and made the following remarks connected with the manufacture of domestic wines: The production of pure wines for home consumption is a subject not only of much importance as a matter of economy to us as a people, but of still greater importance as it relates to matter of health with the masses, and will continue to do so as long as so many will persist in drinking

something beside water. We will not attempt to discuss the subject of total abstinence, or whether wine is better than water, but when we look over the past history of man, we find him always attempting to improve or change the works of nature. He is not content with the fruits and vegetables of earth as he finds them, but is continually trying to bring about a change, or, as we express it, an improvement. He has changed the wild crab to a luscious Newtown pippin, the wild pear of Prussia, which the swine refused to eat, into a Virgalieu or Duchesse d'Angouleme. Not content with these fruits at one season only, he must have them throughout the year. So he has produced the Madeleine and the Eastern Beurre. It is to this spirit of improvement, or desire to change that which nature has given us, that we are indebted for the invention of wine, for wine in its pure state is only the nutritious portion of the grape, preserved so that it may be in condition for use at any time of the year, when our wants or pleasures desire it.

That good fruit of any variety is a promoter of health, no one will pretend to deny, and a good and pure wine made from good grapes, has likewise been acknowledged for ages to be a drink that is conducive to the health and the long life of the partaker. But it must not be expected that a palatable wine can be made from a hard and unpalatable grape, and a wine made from such a grape, and made palatable by mixing some foreign substance with it, is well known to be pernicious; and we have been surprised to hear men state that large quantities of pure wine had been made from our northern fox grape, with only the addition of sugar, when they must know that when cane sugar is added to the juice of the grape, it is no longer pure wine. One of our leading pomologists stated, not long since, in a public lecture, that 30,000 gallons of wine were made last year near Boston, Mass., from the wild grapes of the woods. It was made drinkable by adding sugar. And further, the manufacturers of this beverage put on the garb of public benefactors, and recommend it for medicinal and sacramental purposes. They might as well recommend New England rum, for it is nearly the same thing, only not quite as strong, for rum is made by fermenting cane sugar; and when you put cane sugar into your grape juice, and then let it ferment, you have rum and grape juice, but not wine. The great difficulty with our grapes has been that they did not contain sugar enough to create alcohol

in sufficient quantities to prevent the wine undergoing the acetic fermentation instead of the vinous; and then we had vinegar instead of wine—unless we added sugar, which produces as we said before, rum and juice instead of pure wine. Grape sugar and cane sugar are chemically different, therefore we conclude the alcohol produced by the fermentation of the two is different. Although chemists cannot or do not tell us in what the difference consists, yet we know that they act differently upon the human system. A grape to make wine that is palatable, and that will keep, must contain sugar enough to produce a certain amount of alcohol; but not in such quantities as we get in our imported trash, or in wines made from our poor sour grapes, with sugar added. None of the best pure light wines of Europe are ever imported, for the very reason that they will not bear a sea voyage unless they are recharged with alcohol. We have been so accustomed to sweet wines, and sweet drinks of all kinds, that we do not appreciate a pure wine if it is a little sour, as most of the pure wines which contain but a small per cent. of alcohol are. The acid of wines is tartaric acid mostly, and therefore compaartively healthy. The preservative qualities are alcohol and tannic acid, with a small quantity of malic acid. Sometimes, when there is not sugar enough to produce alcohol sufficiently to preserve the wine and a sour wine is not objectionable, the juice is fermented with the stems and seeds, so as to extract more of the tannic acid which is mainly derived from these. The wines made in hot climates are more alcoholic than those of colder countries; and when we get grapes here that will make wine that is sweet enough for our tastes, or our tastes become modified or cultivated so that we can appreciate a pure wine, then we may rest assured that this latitude of the United States will produce as pure and healthy wines as any other country of the globe. Now, the question arises, shall we ever produce such wines? Certainly. We have done so already, and we hope to prove to you to-day that good wines are not only being made, but will continue to be made every year, showing a marked improvement in their quality. In substantiation of this assertion, we shall offer for the inspection and taste of the members of the club some wine made by John E. Mottier, of Cincinnati, Ohio, who has been a wine producer for more than twenty years; and, from the appearance of his vine-yards and wine-cellars, one would expect nothing but pure juice of the grape, as everything about

his place is scrupulously neat. This wine is the pure juice of the Catawba, the vintage of 1858. It is out of the same cask as that to which was awarded the first premium at the national fair at Chicago in 1859. We will venture to assert that if we never have wine of poorer quality than this, we shall be better served than the people of European wine-growing countries. While Mr. Mottier makes such excellent wine from the Catawba, he says that it would be much better if from a better grape; and he believes that some of the new grapes will entirely supersede it, for the Catawba is quite uncertain in its crops, besides, in cold seasons it contains too little sugar. While trying some wines a few weeks since, at the residence of J. G. Schneike, of Cincinnati, who has experimented with as many varieties of native grapes as any other man in this country, he made some statements which may be as interesting to others as they were to us. For the best six vine-grapes in the latitude of Cincinnati he named the following, and grades their relative quality in the order they are named:

1. Delaware.	4. Lincoln.
2. Herbemont.	5. Catawba.
3. Minor's Seedling.	6. Union Village.

With the *Diana* he had but little experience, but from the wine he had made from it he was inclined to place it next to the Delaware, in the place now occupied by the Herbemont, as that grape had proved to be very uncertain in its crops, as the vine is too tender for this climate.

The *Delaware* wine was the richest, and preserved the real bouquet of the grape, and it improved by age. The vintage of 1859 contained 8½ per cent. of alcohol.

Herbemont—Very uncertain; no good wine since 1850 until 1859, when the crop was good; wine very good; quite delicate; will not bear transporting to any great distance. Alcohol, 5½ per cent.

Minor Seedling—Quite foxy in flavor, but a fine light-colored wine. Alcohol, 6 per cent.

Lincoln—A dark colored wine; resembles the finer grades of clarets, only much better than that we generally import. Alcohol, 4½.

Catawba of 1859—Much body and strength; light amber color. Alcohol, 8 per cent.

Union village—A beautiful dark-colored wine; not much body or strength; will make a fine, light, summer drink. Alcohol, 5½.

These wines were all made from the grapes without the addition of sugar or any other substance. The grapes are gathered when very ripe, and all green, broken, or decayed berries picked out and thrown aside; all the apparatus that belongs to wine-making is kept in perfect order, and cleanliness is a prominent feature in the vineyards of Messrs. Mottier and Schneiker as it always should be in every establishment where good wine is expected to be made. The wines of Cincinnati have already become so celebrated that they sell for a much higher price than many of our imported wines. Large quantities of poor Rhine wines have been imported and taken to Cincinnati and there put upon the lees of the Catawba and fermented with them and then sold for Catawba wine, at a profit, for Catawba will bring $1.25 per gallon, and cheap claret can be had for 50 cents, after paying the duty which has been imposed on such wines the year past.

To show that our pure native wines are not so strongly alcoholic as many of common drinks, we will give the amount of alcohol that some of these beverages contain. Of course they vary much in different specimens, but this list will show very nearly the average:

Currant wine	20	per cent.
Porter	23	do
Champagne (pure)	12	do
Gooseberry	12	do
Elderberry	9	do
Cider	7½	do
Ale	7	do
The lowest Rhine wines	4½	do

Prof. Mapes stated the process of wine-making at Cincinnati, and the object of having the great wine-vaults; that is to avoid all variation of temperature. If the thermometer varies more than 5 deg. you cannot make wine perfectly. Sparkling wine is not made by bottling the wine while in a state of fermentation; nor can such wine be made by any artificial addition of materials. Sparkling wines are always made of the most inferior wines. The best brandies are not made of the best quality of wines; but good brandy cannot be made except the wine is pure. The Cincinnati brandies are generally execrable.

The wines presented by Mr. Fuller were tasted by a number of good judges, and pronounced excellent—very excellent.

At the next meeting, spring planting, flowers, etc., will be discussed, and domestic wines will also be continued.

The club adjourned to next Monday.

H. MEIGS, *Secretary.*

May 21, 1860.

Present—45 members.

Mr. John G. Bergen in the chair.

The Secretary, Judge Meigs, read a number of papers, translated from late Paris journals, and others, of which we make the following notes:

THE BEAN.

The following is translated from the Société D' Horticulture, for May, 1860.

"M. Georges de Martens, of Germany, has published this year, at Stuttgart, in German, a quarto volume of 92 pages, with 12 colored plates of beans. He has studied the subject profoundly, and rendered great service by removing doubts and difficulties for the benefit of the world. Unhappily for us (France) it is in Geman, so that the greater number of our gardeners and farmers cannot read it. Our committee on publication deemed it a service to France to make the following analysis of his work:

"The greater part of our plants and animals, domesticated, have no wild ones like them, and so it is with the bean. Theophrastus, in the fourth century before our Savior, is the first who speaks of it. It is admitted that the Greeks obtained it from India about the same time they did rice, on the return of the army of Alexander the Great. De Candolle doubted this origin from India because our garden bean has no name in the Sanscrit—and Rogle, in his Legumina, does not speak of it as cultivated in India, but only in Cashmir; but there is a passage in the Illiad, where Homer says the Greeks cultivated it. It was late in reaching Italy. Neither Cato nor Varro knew anything of it. A doubtful mention of it occurs in Virgil, Georgics 1, line 227. Columella, later mentions it as *Fasellus*, &c. The bean reached Great Britain in 1597.

"Capt. Gosnold brought it to America at Elizabeth Island on the coast of Massachusetts in 1602. It reached New York in 1644, and Virginia in 1648."

CICADAE—SUMMER FLY OR SEVENTEEN YEAR LOCUST.

Prof. Mapes.—This peculiar insect appears once in 17 years; but the year of its appearance differs in every part of the country. In 1855 it infested Southern Illinois. In 1800, 1817 and 1834, the trees of Delaware and Maryland were literally covered by them, and in 1843 many of the river counties on the Hudson were infested with the Cicadæ. The male insect has a pair of drums on each side of the head, and when infesting an orchard or woods, the noise is frequently so great that no conversation can be heard in the vicinity. The insect appears about the 25th of May, and remains six weeks. The female is armed with an *ovipositor*, with which she inserts her eggs in the smaller portions of limbs of fruit trees, oaks, chestnuts, &c., always selecting new growth of an eighth to a quarter of an inch in diameter. The incisions, about twelve in number, are made at an angle of forty to fifty degrees, with an egg in each, and sometimes the twig is girdled near the eggs, so that when the end of the twig dies it falls to the ground, and the eggs are carried in by dews and rains. Miss Morris, of Germantown, Pa., a well known entomologist of close observation, claims that she found them attached to the roots of pear trees.

"While plowing at our place, May 10, these insects were thrown out in large quantities. The holes through which they ascend in the soil may be traced to a depth of four feet or more. This locust is not to be dreaded, as they do but little harm; are not known to feed, and the shortening in of limbs by the depositing of their eggs, may give a useful hint to those who do not understand the benefits of the shortening-in process."

INQUIRIES FROM IOWA.

Solon Robinson.—I have just received a letter from Mr. H. Howard, of Decorah, Iowa, who looks to us for information upon the cultivation of several garden plants, and other matters.

"First, in relation to the cultivation of pie-plant. Is upland or lowland soil most congenial to its nature? Would mulching or a top dressing of coarse manure be beneficial? Should the stalks be cut off, or dislocated from the root by pulling off? How often is it proper to reset and divide the root? What is the process of making wine from pie-plant juice? Will the seed of any variety bring forth the same variety?

"Second—What is the most profitable variety of Strawberry to cultivate on a somewhat extensive scale? Does Hovey's seed-

ling need staminate plants from some other varieties to fecundate them, or does this variety possess both pistilate and staminate qualities? (I am told this is not the case.) How is it with Wilson's Albany seedling?

"Third—Will the Lawton blackberry live through the winter in our latitude unprotected?

"Fourth—What is the best variety of grape for this latitude?

"Fifth—Is the Cape grape hardy?"

Answers—1. The pie plant will grow upon any rich soil, whether naturally so or made artificially. It grows the most rank upon a black mucky soil, and is fond of moisture, but the land must not contain stagnant water. The stalks should be pulled off. The roots need not be reset for many years, but may be divided as often as new sets are wanted. The process of making wine was given last week. The seed will not certainly produce the same sort.

2. The most profitable strawberry is as hard to determine as the most profitable breed of stock.

The report of the committee of the club last year is very satisfactory for this locality.

Hovey's seedling must have fertilizing plants set with it. Wilson's seedling is a perfect plant and fertilizes itself.

3. The Lawton blackberry will winter anywhere in this latitude.

4. I esteem the Delaware the *best* variety of grape, though several others are very valuable. The Diana next.

The Concord was also highly recommended by Mr. Carpenter and others, ripening two weeks before the Isabella.

THE COCKCHAFER.

Dr. Trimble gave a history of this insect, which remains in the ground, like the locust, four years, and then comes forth in immense numbers, but in the flying state. They do not feed, and consequently do no damage to plants.

THE CURCULIO.

Dr. Trimble says the curculio has already commenced its ravages this spring. He is also satisfied that the curculio stings the bark of plum trees and produces the disease known as the black knot. He has made a great many experiments to prove the insect identical with that which destroys all of our smooth-

skinned fruit. The jarring of trees to shake off the curculio is effectual, but it is an immense labor, as it must be attended to every day, and some sunny days several times a day. He said that, unless some remedy for this insect can be discovered, we shall be unable to raise any fine fruit. It is the curculio that causes the disease in apples known as gnarly. We get no good apples in Jersey, and it is out of the question to raise plums, apricots, or fine peaches. We import prunes from Germany cheaper than we can make boxes to pack them in—the plums grow to such perfection in that country.

Mr. Lawton.—I have removed bushels of black knots from my cherry trees and burned them. I found in all these knots a living worm. I destroy the common catterpillar by collecting them in the nests and destroying them.

GRAPE VINE AND OTHER PESTS.

Dr. Trimble.—Here is a specimen of the insect that curls the grape leaf. Now is the time to look after them, and pick them off by hand and destroy them, or they will destroy the vines. Here is another curious insect that infests the currant bushes. It is what we call lice, and these lice furnish food for a colony of ants, by their exudation of a sort of sweet substance. Here is the aphis that curls the currant leaf; and here is another curious insect that binds itself up in a web and a leaf, and what is remarkable, this insect is itself full of other insects—parasites that live upon the other, and in a great measure destroy it. I wish that some parasite could be found to destroy the curculio. Perhaps it may be destroyed in time, as the Hessian fly has been.

A PEACH DESTROYER.

The Chairman presented a new pest of the peach; a worm that fixes itself in the footstalks of the leaves, and destroys them. It is a dark-colored worm, about an inch long.

Wm. S. Carpenter.—This insect discussion is one of great importance to farmers. These little, insignificant things are great destroyers of our crops. He spoke particularly of the bugs that eat up the potato vines.

FRUITS, FLOWERS, AND SPRING PLANTING.

The regular question of the day was now called up. William Lawton exhibited specimens of strawberries in bloom, to show the difference in the blossoms—the staminate, pistilate, and

the perfect flower which produces fruit without impregnation from any other plant. The Wilson seedling has a perfect blossom, and is one of the most productive strawberries known; the fruit is pretty strongly acid. Many of the flowers of the wild strawberry are barren for want of other plants near them to furnish impregnating pollen, and that is the reason why we see such a show of blossoms some seasons in the fields, and so little fruit.

Wm. S. Carpenter.—It is important to know how to cultivate small fruits, and that is what we cannot always learn in books. Now, the ground around raspberries and strawberries should never be disturbed in the growing season.

The Secretary.—It is said that Chili produces the best variety of strawberries. I have tried them. I mulched my bed with the remains of a wood cellar, *raking* out the coarse barks and chips, and produced a most abundant crop.

Mr. Carpenter.—In transplanting strawberries I mulch the bed, and my plants will live in the dryest weather. I use fresh cut grass.

The Chairman.—It is not always true that disturbing the ground about raspberries and strawberries will injure them. We always used to plow and hoe the ground about our raspberries in the spring, and got good crops.

Mr. Pardee.—Still the general rule is that all fruit plants in the bearing season should not be disturbed. It is because that in hoeing we are apt to injure the fibrous roots. To maim these is liable to injure the power of the plant to produce fruit. I would transplant strawberries early in July, and fix the bed in the fall, so it would not need any disturbance in the spring. It is important, if you want a full crop of any fruit, that you prepare for it when the plants are not in bearing. In hoeing around strawberries, care must be taken not to cut near the plants. I mulch my beds, and don't sow weeds. You can soon annihilate weeds by not sowing their seeds.

SPECIMEN OF THE AGAVE AMERICANA.

Mr. Garvey presented a specimen of the above plant, and made some remarks upon its history interesting to the club. He thinks that more attention should be paid to the cultivation of this plant at the south, on account of its fiber.

CULTIVATING PEACH TREES.

Dr. Trimble said that he had an orchard one year very fully set with peaches, and while so he put on a quantity of manure, and plowed it in, breaking the roots, on purpose, to prevent the trees, which were young, from bearing a heavy crop and it had the effect.

The next meeting will discuss the proper manner of cultiva ting corn and fruit, and the pest of fruit-growers.

The catalogue of seeds, plants, &c., by Alfred Bridgeman, was presented; and Mr. Meigs took this opportunity to say, that frauds in the sale of seeds and plants are proverbial, not omitting those furnished in the market of Barataria by the honest and wise Don Sancho Panza, the Governor of that distinguished Island of the admirable Cervantes De Saavedra. A fraud of this sort robs a man of his time more precious than life; he waits in vain, the promised Beurre pear proves a choak! Not one in a hundred thousand men is a careful and accurate observer; he looks abroad and defines nothing, stars or insects all one. Science so limited in its knowing ones, is confined (said John Baptist Say, in 1804, one of the most approved political economists) to so small a number of men, that all of them in France can find perfect accommodation in the *smallest room* in *Paris*. The Club adjourned.

H. MEIGS, *Secretary*.

May 28, 1860.

Present—72 members. Dr. Trimble in the chair.

GIANT ASPARAGUS.

Mr. Feeks, of Oyster Bay, exhibited specimens of a giant asparagus, grown at Oyster Bay, and originated from seed at Matinicock, L. I., the bed of which is now some thirty years old. Some of the stalks are nearly an inch in diameter. He stated that he had about four acres, which he called only a "small patch," because some others had more than twice as much, and he had been told that one man near Jamaica has seventy acres. His beds are made upon good potato land, plowed deep, and highly manured with stable, or hog-pen manure. At one year from seed, the plants are set in rows four feet apart, and fifteen or twenty inches apart in the rows. We trench fourteen inches deep, with manure

at bottom, which is covered with three inches of soil, and the roots set, and the trench filled gradually during the summer. In cultivation we plow off the earth and put manure in the furrows abundantly. My bed is so near the level of salt water that the tide rises upon it at very high water. Our beds yield $300 an acre. We do not cut it much, if any, the first two years. We put fifty loads of manure per acre, and five hundred pounds of guano. Some growers use 1,500 pounds of guano per acre. The branches of sixteen stalks weigh four pounds. The best asparagus is that which grows above ground. The white is always tough. We sometimes have bunches that are eight inches of tender green.

WHAT IS A MERCHANTABLE GRAPE-VINE?

Solon Robinson read a letter from Ira Brown, of New Haven, Vt., who asks the club to give an opinion as to what shall be considered a fair, merchantable, grape-vine; that is, the thickness of the main stem, the number of eyes it should have, and what length and thickness the roots should be, "because," he says, "at present there is no standard, and some nurserymen send out plants to fill orders, the stems of which are no bigger than rye straws, and roots very diminutive; others, with larger stalks—cuttings from older vines—have scarcely the beginning of roots. Sometimes the wood is all cut away but a single eye, to propagate other vines from; and in this way the people in the country are cheated until they have lost confidence, and some have lost patience, after repeated losses of money and vines. I think the American Institute Farmers' Club would do the community a favor—it certainly would me—if it would express an opinion upon this subject as to what should be considered a good vine. I know you have no legitimate authority to determine for others, but you can say for yourselves, and that alone would carry almost undisputed authority to the community; at least, we could appeal to you for authority as to what you consider fair. I believe you owe to the community this influence, and hope you will not withhold it, as thousands of dollars are paid for worthless grapevines every year, for want of some authority, above that of the vender, to determine what constitutes a good vine."

Mr. Robinson—I think so too, and I hope gentlemen will express themselves freely. For my own part, I freely say that a vine with a stem no bigger than a straw is not a fair merchant-

able vine. Such, however, may be sold of the very rare sorts to a purchaser present, or one who perfectly understands what he is buying. But such should not be sent out to fill orders. Neither should a stump of a vine, upon which a few roots have been forced to grow in a hot-house pot. No definite rule can be adopted as to the size of vines, because there is a great variation in growth of different varieties. The Isabella, the Catawba, the Concord, the Northern Muscadine, the Hartford Prolific, and some others, are strong-growing, rather coarse, woody vines, which, at two years old, might be twice as large as a good Delaware, Diana, Rebecca, Anna, or some other sort that does not make wood fast while growing. The Delaware, in particular, grows a small, hard, wiry vine, very hardy, and well rooted; but even this should never be sent out, and never is by an honest nurseryman, when only the size of a rye straw.

The price of this sort has continued and is likely to continue so high for some years, that propagation has been forced to such a degree by some unscrupulous and some unskillful men, that I do not wonder that the patience as well as confidence of those who have received such is well nigh exhausted, and that they should appeal to some authority for a standard. I cannot say what that standard should be; but I can say what it is with a a man who, I do most fully believe, is an honest nurseryman. I received this spring, upon order, not by selection, from the great propagating establishment of Dr. C. W. Grant of Iona Island, an island in the Hudson, near Peekskill, and the greatest propagating establishment in America, a lot of his No. 1 Delaware vines, every one of which had a cane the size of a pipe stem, with three good eyes, and a bunch of roots which required a hole from twelve to eighteen inches across in which to straighten out the fibers.

The Diana, the Rebecca, the Anna, the Lenoir, were of the same size and character. The Herbemont, the Concord, the Hartford Prolific, and Canby's August, had canes as large as my smallest finger, with masses of roots. Such Delawares as I bought are $50 a dozen, and from the vigor with which they are starting, I shall expect to get fruit in two years. Now our Vermont friend may take such vines as I have described as the standard of No. 1 vines of one good nurseryman. I don't mean to say that all that he sells are of that size, because he sells good, strong-rooted plants with shoots two feet long, of smaller

size, but not so small as straws, at about one-third the price of mine. If Mr. Brown will send a three-cent stamp to Dr. Grant and get his catalogue, he will see what sort of vines, and the price, are sent to order, and I think that this club will unanimously agree with me that his vines may be taken as a fair standard, and that the people who are anxious to plant vines should not be cheated by having inferior ones palmed off upon them. It is that that discourages them, and sets back the grape cultivation more than all that we have said in its favor for years can set it forward.

Not only in vines, but in all the products of the nursery, there has been cheating enough in the vicinity of this city—if Sodom and Gomorrah burnings were fashionable in these days—to call down a shower of fire and brimstone large enough to overwhelm the whole tree-growing fraternity. And I don't know where I could put my finger upon five of them honest enough to avert the shower.

If there is any dissent to my opinion of what buyers have a right to expect as a good vine, I hope members will express it, and let me put it on record. If our authority is worth anything, let the country have the benefit of it.

To these sentiments the club made no objections, but some of the members thought them eminently just.

THE CURCULIO.

Dr. Humphrey recommends burning tar, mixed with sulphur, under trees infested with curculia, to get rid of this pest.

The Chairman exhibited plums, all of which are marked with the curculio thus early in the season.

CORN CULTURE.

Wm. Lawton called up this subject.

The Chairman said that he had always found it advantageous to plant corn early. It is much less work, as a general thing, to tend it. In protecting fields from crows, he has found the best remedy to tie young crows to strings stretched across the field. Their calls drew a great many old crows which came to see what the matter was, and went off and kept off that year and the next.

Mr. Feek stated that a very troublesome case of crow depredation was cured by suspending young crows dead, which so alarmed the old ones that they left in disgust. He finds tarring

corn seed a good preventive. As to crows eating corn, I know that they alight upon corn-stalks in the fall, and eat all the ears within reach.

William Lawton advocated late planting of corn, say in the first week of June.

The Chairman thought the Dutton corn, planted June 1, would generally ripen, in the latitude of Albany. It would require one hundred days to come to maturity.

Mr. Quinn, foreman of Prof. Mapes's farm.—Care should be taken in selecting seed. I would only use the best grains in the center of the ear. The land should be deeply prepared, and marked each way 3½ feet by 3½ feet, and put seven or eight grains to a hill, and leave five stalks to stand. We cover one inch deep, and cultivate with Knox's horse-hoe, and never hill up. We use the subsoil plow in preparing land and in cultivating. The white Flint corn is the most productive sort that we grow. I have never known crows to eat corn. They certainly pull it up, for I have seen it lying upon the ground uneaten, where they pulled it out. We prefer to plant in May to a later day. Our greatest pests are the blackbirds, which destroy a good deal of corn that pushes its point out of the husks.

CRANBERRIES—MAKING A PLANTATION.

Solon Robinson—Since our last meeting I have been engaged in making a cranberry plantation. Perhaps, if I tell what I have done, and how I did it, in detail, it may be useful to somebody else. If it should be the incentive to others to make a plantation of these beautiful little berries, so as to produce, only for family use, an abundance of this health-promoting, acid fruit, I shall be able to say that I have, by my example, done some good to some one of my fellow-laborers.

When I domiciled myself, a year ago, upon my little farm in Westchester county, I found truth in a remark of one of my neighbors to a friend, who made inquiries as to what sort of a place Robinson had got. He replied: "Well, naturally a pretty good piece of land, though it has been hard used, except one ugly spot of about a quarter of an acre, which is good for nothing, in fact, worse than nothing." "Why, what is the matter with that?" "Oh, it is a bit of swamp, too near the house to be pleasant, and too wet to cultivate."

And so I found it. Over shoe in water, covered with bogs,

brakes, briars, alders, and other swamp productions, decidedly "too near the house" to be pleasant, for the house stands in the center of a lot of eight acres, and of course pretty near all parts of it.

When I got my house built, and things set to rights around it, I pitched into this "bit of swamp," with three Irishmen, and the tools necessary to cut down, dig out, root up, and get rid of the bushes, root and branch, including another half acre along the brook not quite so swampy. By going a mile down the brook, and getting some of my neighbors to help a little, I got the water of the brook to run away upon a pebbly bed, instead of oozing through a mass of muck, and then I found that a short side-ditch made my swamp plowable, and forthwith its sod was reversed. True, the plowman complained of a degree of softness which let his plow in unpleasantly deep, but I didn't care. I said, "let her rip." When done I said, "what a mass of muck." I will have it all hauled up the hill, and spread where I am going to plant blackberry plants in the spring. It is the best kind of manure for them. I would have composted it if I had anything to compost it with.

After I had got all the sods, and bogs, and roots, and loose muck off, I found that the sponge being taken away, the water took itself away; and I plowed it again, this time turning up some of the white sand that underlies the surface. It lay freezing, and thawing, and mellowing until dry enough to plow and harrow this spring. Last week I received from Mr. E. Bagley, of Usquebaugh, R. I., the premium cranberry grower of "Down East," two barrels of cranberry vines, partly cut and partly pulled, with roots, from his meadow. They were said to be of the cherry variety, and cost $4 a barrel—$8 for enough to set out upon a quarter of an acre. First I put a man with a stout yoke of oxen to plow the ground. It is not now a swamp, but about as dry, on the surface, as the land alongside, where the oats are growing most luxuriantly. After plowing, it was thoroughly harrowed, and then furrowed twenty inches apart, and set with vines in little bunches, from six to twelve inches apart, or with long runners laid down in the furrow, and covered with a hoe, leaving the sprouts out. All the vines in the barrels had to be overhauled and sorted out, and straightened, and were then dipped in muddy water and planted, whether with or without roots, so

as to cover the butts some inches, and leave the tops out, very much as one might plant currant cuttings.

Fortunately, a few hours after we had finished, we had the refreshing and much needed rain of Saturday evening, and I trust that next year, my neighbor won't look upon that bit of a swamp as quite so undesirable a spot as he did last year; and if it produces fruit, as a great many similar spots in Massachusetts have done, I hope the owners of a great many "bits of swamp" in the county where I live, will be induced to change their appearance and fruitfulness.

Upon Cape Cod, where cranberry culture has been carried to the greatest extent, swampy land, that was a few years ago considered utterly worthless, has now a saleable value of $800 to $1,200 an acre; and some of the owners of such land have found it a good investment of time and money to expend from $200 to $1,000 upon an acre, to bring it into a condition fit to be planted with cranberries.

In view of these facts, I make this pertinent inquiry of every farmer in all the Northern States, where cranberries are found growing wild: "Are there no swamps, or wet valleys, or brook borders upon your farm, now, perhaps, unsightly spots, as this of mine was a year ago—wet swamps in winter, and dry and pestiferous in summer? If you have such, plant them with cranberry vines, and tend them one or two years till the vines get well set, and then they will tend themselves, and produce you on an average more bushels of fruit per acre than you get of potatoes; and it is not much more work to gather it than it is the tubers, and, generally speaking, you can sell a bushel of cranberries for the price of five bushels of potatoes."

Truth, it is said, lies at the bottom of a well. The well that holds the truth in relation to cranberry culture and its profitableness upon many of the worthless bogs that render farms unsaleable, as in the case of mine, and detract from the value of the upland, must be a remarkably deep one, or it would have been dug out before now, and made to shine in all the rich crimson luster of a field of this ripe fruit. Here upon this little brook, where I have made the first plantation, there is now, above and below, more than a hundred acres, more valuable than my little corner for the purpose, and now of almost no value; and if all converted into a cranberry plot, the whole could be flooded for a cost of $100 for a dam where the brook cuts through a narrow

gorge in the rocks. And this is by no means a solitary case. All over the country there are just such locations—just as suitable for the purpose—just as worthless for any other.

Will what I have said to-day induce one single owner of similar swampy spots to clear a single quarter acre, and plant it with cranberry vines? Let us hope.

Subjects for the next meeting: Corn cultivation, fruits, flowers, spring planting, &c. Adjourned.

HENRY MEIGS, *Secretary.*

June 4, 1860.

Present—54 members. Andrew S. Fuller in the chair.

THE LOCUST QUESTION.

Judge Meigs, the Secretary, called up the locust question, as one of great interest at the present time.

The chairman said that Dr. Fitch stated, four years ago, that the seventeen year locust would appear this year in New Jersey and other places.

Dr. Trimble—Well, they have come, and here is a sample of them. These are the shells, attached to the leaves of this cherry tree, and I have no doubt that one tree contains 5,000. They come out in the night, and adhere to some leaf or branch, and before morning they leave the shells with wings perfect and ready to fly. Under some old apple trees there are great numbers that cannot fly, these are consumed by birds and poultry, and even cats—pigs, too, are fond of them. Already some of the trees appear to be alive with these insects. They came out the first day of June, exactly seventeen years from the time of their last appearance.

Dr. Trimble then read the following article, which was published in The Newark Mercury, to allay the fright of some of the people, who are already beginning to be alarmed at the multitudinous army of sappers and miners.

THE CICADA, OR SEVENTEEN YEAR LOCUST.

I have been very much interested in the reappearance of this singular insect after the lapse of just seventeen years to a day. Last evening and this morning they could be seen coming out of the ground in all places where trees were growing seventeen years ago. They crawl up the trees and bushes, attach them-

selves by their claws to the bark or leaves. After remaining quiet a little while you may see the line in the upper part of the back gradually open, and soon the back of the inclosed insect will be seen emerging, then follows the head, then the limbs, and finally the entire insect has cast off the subterranean coat which has lasted it so long. Soon the wings, that have been folded up in the smallest possible space, are unfolded and shaken loose, and you are surprised at the extent to which they are expanded. At first, the locust, after casting off its coat, is exceedingly delicate, almost diaphanous in appearance, but it soon after becomes darker colored, stronger, and in every way fitted for the great change that has so suddenly taken place in its nature.

Many people—indeed, many good people—have already commenced the work of destruction of these beautiful creatures. Indeed, the organ of destructiveness in many people is so large that they wage an indiscriminate war against all insects—to me the most wonderful of all God's creatures. Some insects, certainly, are injurious, but many are useful; just so with birds—the man that kills them all will soon find his mistake. Let every one study the habits of all these little creatures, learn which is useful and which injurious, and then, and not till then, assume the power of dominion that God has given him.

The locust is perfectly harmless. They eat nothing except to sip a little dew, during the few weeks they live in this form of their existence. The silk worm, as a worm, is a gross feeder, but as a butterfly it eats nothing; so with the locust, and many others of these creatures which assume such wonderful changes in their existences. The last, or winged stage, is their season of love; the male sings, and the female lays her eggs, and then they die. The only possible harm they do is to the small twigs of trees that the eggs are deposited in. These die and fall off in the Autumn. Some of our orchardists say that our fruit trees should be headed in by cutting off a part of each year's growth; if that is so, the locust is useful.

In a few days our forests will be vocal with the singing of these locusts. To the man whose heart is right it will be music—to some it will be a mere noise. Seventeen years ago, some of the Millerites thought the end had really come, and they were looking about for their ascension robes. This year, your poultry of all kinds, your hogs that run at large, and all the birds, will be busy feeding upon the locusts. The crows, this season, will

not disturb the farmer's corn-fields—the locusts will afford them a more palatable food, with much less danger from the guns of the farmers' boys.

Although the locust appears only once in seventeen years in any one locality, and observes that periodicity with absolute certainty, they do not appear in every part of the country at the same time. There is a difference of nine years between East and West Jersey. The writer of this remembers their appearance in West Jersey, Eastern Pennsylvania, Delaware and Maryland, in 1817, 1834, and 1851, and has heard his ancestors speaking of them as appearing in 1800 and 1783. Here, and in Eastern New York and Western New England, they appeared in 1826, 1843, and now.

In parts of the western and southern country they appear in equal or greater numbers, but at other times, and always after the lapse of 17 years in each place. In Northern New England and Canada they are not known. Neither is, exactly, the same insect found in Europe or other parts of the world. The locusts of the Bible, one of the plagues, was a much larger insect, and more like our grasshopper in form, and, like the grasshopper, had no subterranean existence, and of course, lived, and grew, and fed upon the surface. A few years ago an immense grasshopper appeared in vast numbers in Utah, the Paradise of the Mormons, and some hoped that they would reappear in still greater numbers, and be a plague that would drive away and scatter this miserable people. But we have no account of their return. Probably they have their periodicity, and it may be many, many years before they come again.

The Cockchaffer, a black bug (as people generally say), appears in places about the last of May every four years. In walking or riding out at night you are constantly annoyed by their flying against your face. I have seen them by thousands on the piazzas in the country, where they have been wounded by flying against the houses during the night. This is a dark brown beetle about three-fourths of an inch long, lives but a few days, flies only at night, covers itself up about an inch deep under the soft ground in the day time, makes no noise except by the rapid motion of the wings. In its grub or larva condition, it is a white, crooked worm, and in its third and fourth years about an inch long. Country boys use it as bait for fresh-water fishing; this year they will prefer the locusts for that purpose.

And there is the Ephemera, too. It is in our air for a few hours only—a little fly that appears near sunset of a summer evening in such vast clouds in some parts of the world, that the sands of the sea shore could hardly equal it in numbers. These little creatures have been living in another form for four years, and under water too. If you observe carefully the muddy banks of your fresh-water streams, you will find places almost as cellular as a honey-comb, and here these little fellows have their homes—comfortable homes—carefully arranged, and all they want. There they live, and move, and have their being for four years, and then when their full time is come they rise to the surface of the water, emerge from their submarine coats, take wing, meet their lovers, scatter their infinitesimal eggs by myriads upon the surface of the water and die.

I have thus given a brief account of a very few of these singular insects that appear at longer or shorter intervals.

During the seventeen years the locust is under ground it never changes its form—it is supposed to attach itself to the tender roots of trees and plants and live by suction. To me it is a welcome guest, I love its music—I think it beautiful—it is certainly wonderful. To contemplate it, you cannot but contemplate also the God that created it. The only regret I have in seeing it again is that it is seventeen years since I saw it last.

June 1, 1860. Yours, T.

Yardley Taylor, of Virginia, gave an interesting account of the locusts in Virginia. In the valley there are two sets of seventeen year locusts, so that they come eight and nine years apart. Each parcel are seventeen years apart.

Dr. Trimble thought that this was where two broods overlap each other.

The Chairman gave several locations where the families overlap. In 1855, they were in Illinois, Iowa and Kansas.

Mr. Taylor gave the dates of their appearance each eight and nine years since 1817. In some cases, in coming out where a brick-yard was in operation, the locust bored right through the bricks drying in the yard.

Wm. S. Carpenter read the following item, from the Boston Transcript, upon the grape culture, which elicited some discussion:

GRAPE CULTURE.

From all accounts, the grape crop in the United States will be

an abundant one the present year. It is stated that there are now about 4,000 acres laid out in vineyards in Ohio, half of which are in the immediate vicinity of Cincinnati. The yield last year is estimated at 350 gallons per acre for the whole State, which is much above the usual average. From a careful estimate of the vintages for the last twelve years, the average yield for the Ohio valley is 200 gallons per acre; on well cultivated vineyards in favorable positions, 300 gallons, which is about the average product in France and Germany. In Missouri and Illinois, the yield does not exceed 200 gallons to the acre, owing to the prevalence of rot; and in Tennessee, Georgia and South Carolina, it was very much reduced by a destructive frost in April. The hills of South Carolina and Georgia are rapidly becoming covered with vineyards. One wine-grower, Dr. McDonald, has already planted ninety acres with the grape. In regard to the variety, the Catawba suffers greatly from untimely frosts wherever they occur. Several new species that seem less subject to disease have already been partially tried, and found to yield wines superior in quality to the Catawba, Cape or Isabella. The Delaware is the best—the Venango, the Herbemont, the Diana, and the Norton's Virginia for red wine, all of very superior quality; and it would seem a matter of wisdom in the planting of new vineyards to introduce several varieties, in about equal proportions, instead of planting exclusively the Catawba, as we have been too much in the habit of doing. In this way there would be a chance of securing a crop of one or more kinds in seasons when others fail.

The Chairman stated that 700 gallons per acre was the highest quantity ever made near Cincinnati.

Prof. Mapes.—Here is a bottle of wine made last fall by Samuel Wettervell, Bethlehem, Penn., from Catawba grapes by a new process. The sugar is placed in a kettle, with water at about 17° Raumer, and adds about half a gill of sulphuric acid, and boils it some twelve hours, and then adds chalk enough to take up the acid, and precipitate the acid in the form of sulphate of lime. He uses about a pint of the syrup to seven gallons of grape juice.

MILDEW ON GOOSEBERRIES.

The Chairman inquired if any one could tell how to prevent the mildew upon gooseberries.

Prof. Mapes.—I find careful open pruning and mulching with

salt hay keeps the mildew from mine, which were formerly badly affected.

R. G. Pardee.—I find generous culture and open pruning and drenching with soap suds a good preventive.

Wm. S. Carpenter.—I have manured with barn-yard manure, and salt and ashes, and tended carefully, yet my bushes this year are badly affected.

Mr. Garvey stated that free ventilation was a remedy for mildew.

Mr. Carpenter replied that his bushes grown in the shade were less affected than any other.

Mr. Gale.—I have found, with the same ventilation and some exposure, that one bush mildewed and another did not; I can't tell why.

The Secretary stated that England grows the best gooseberries of any country, and is the most moist and least sunny.

Prof. Mapes.—The mildew is a fungi, and the condition under which the disease flourishes best is in close grown bushes, where the circulation of air is worst. I do not use barn-yard manure, and I do not believe that any fruit except brambles can be made to produce the best results with such manure.

MUSHROOMS.

Three years ago, I built extensive covers to grow mushrooms. My great mistake was building with wood instead of brick. The closeness, and fungi-producing atmosphere, destroyed the soundest chestnut timber in a short time. Now, if fungi flourishes there so extensively, it is fair to conclude that a similar atmosphere in and about plants produces like effects.

Mr. Doubleday.—In all places where steam in a low place is produced, fungi will be generated, and attack timber or fruit, or whatever is most liable to be affected. Charcoal dust is one of the best substances that I know of to prevent the formation of fungi. It is, no doubt, beneficial upon gooseberries. I know it is valuable upon strawberries.

The Chairman.—I have tried all the specifics I have ever heard of, and all have failed with me. If good one year, it failed the next; and now I have no faith in any.

CORN CULTURE.

Wm. S. Carpenter.—One of the advantages of the corn crop is the value of the stalks. I believe that a ton of well-cured stalks is worth nearly as much as a ton of hay. An acre of corn

will give a greater weight of stalks than an acre of grass will of hay.

The following is Mr. Carpenter's statement of comparative cost of the corn-crop, with other crops, at his farm in Westchester county:

Advantages of a Corn crop.

Interest on one acre of land (value per acre $200)		$14 00
Manuring the same		7 00
Plowing sod ground and harrowing		4 00
Marking the rows for planting		1 25
Seed, one peck		25
Tilling, plowing four times, and hoeing twice		7 00
Cutting and stacking		1 25
Gathering the corn		3 50
Shelling the same		4 50
Dr		$42 75
Credit.		
70 bushels of corn at 75 cents per bushel	$52 50	
2½ tons stalks, per ton $5	12 50	$65 00
Net profit		$22 25

Rye.

Interest on one acre of land (value per acre $200)		$14 00
Manuring the same		7 00
Plowing, sowing, and harrowing		5 00
1½ bushels seed		1 45
Harvesting and storing		3 00
Threshing and cleaning 25 bushels at 8 cents per bushel		2 00
Dr		$32 45
Credit.		
25 bushels of rye at 90 cents per bushel	$22 50	
2 tons straw at $8 per ton	16 00	$38 50
Net profit		$6 05

Wheat.

Interest on one acre of land (value per acre $200)		$14 00
Manuring the same		7 00
Plowing, sowing, and harrowing the same		5 00
2 bushels seed at $1.25		2 50
Harvesting and storing		3 00
Threshing and cleaning 25 bushels at 8 cents per bushel		2 00
Dr		$33 50
Credit.		
25 bushels of wheat at $1.25 per bushel	$31 25	
1½ tons straw at $4 per ton	6 00	—$37 25
Net profit		$3 75

I would manure with Peruvian guano, sown broadcast.

Prof. Mapes.—The corn crop of the United States last year was estimated at 800,000,000 of bushels. That alone declares the value of the crop. As to the quantity per acre, it is not hard to grow 100 bushels per acre, as I have repeatedly done, upon underdrained and subsoiled ground. In some districts the soaking of corn in diluted saltpeter, &c., has been found very beneficial. In others it is not advantageous. I plow the surface deeply, and furrow with a subsoil plow, with a pair of stout oxen, 17 inches deep, in rows or checks, and drop with a machine. I never use a hoe—I never hill up corn—it makes it weaker and more liable to be blown over. I do not plow my corn, turning up a furrow and turning it away again, but I use a small soil lifter, raising each side of the row. If the plow is sharp it can be used in reverted sod ground. Then I take one of Howe's horse hoes, and shave the soil about two inches deep. This cuts up and combs out the weeds; one man and mule can do more than fifty men, and do it better. It leaves the soil all so finely pulverized, that weeds can't grow. It is easy to keep the corn crop perfectly free of weeds. As to manure, I put in the dropper with the corn, one-third of the quantity of super-phosphate that I design to use, mixed largely with some divisor like charcoal or dust or prepared peat. At the first hoeing I add another third of the phosphate, and at the second hoeing the other third, spread around the stalks. I use six hundred pounds of phosphate per acre. In feeding corn-stalks, they should not only be

cut, but ground in mills, like the sorghum sugar-mill. If not ground, the stalks should be cut very fine. If put in a tub, with a gill of salt to five gallons of water, and boiled, the stalk need not be cut so fine, as the cooking softens the silicious coat. Upon underdrained and subsoiled ground, corn never suffers with drouth. I believe that I have made a current profit in two years upon all the cost of underdraining, leaving the land worth more than it was before. It increases the value of my land full $50 an acre. My rule of manuring is to use all that I can make the crop assimilate.

Wm. S. Carpenter.—I am in the practice of planting corn for soiling, and I find it a very profitable crop. The expense of putting it in is very small, and the crop comes in to great advantage in times of drouth.

Subject for the next meeting—strawberries.

Adjourned.

HENRY MEIGS, *Secretary.*

June 11, 1860.

Present, 62 members. John A. Bunting in the chair.

MISCELLANEOUS BUSINESS.

The chairman remarked that miscellaneous business was first in order, the first hour being devoted to that purpose.

CROWS AND CORN.

A letter from Ira Brown, New Haven, Vermont, says:

"I see corn and the depredation of crows was a subject last week. No year has ever exceeded their rapacity in this vicinity. The first sowing of wheat, oats and peas was scratched and torn over till the planting of corn, which was rather early—May 5—and so on, for ten or fifteen days, as people got ready. The crows fell upon that. I think, in the corner of one field of a neighbor adjoining me, the crows, in two or three days, uprooted the most of it on an area of half an acre, with half a dozen crows (dead) hanging in the field. He got some arsenic, soaked corn, and strewed it on the field. The corn was gone in a day or two, but failed in effect.

"Half a drachm of strychnine in one quart of water—and two of winter wheat, was soaked and dropped on the fields of corn and wheat just sowed. On a field of wheat near his

barn, after putting out his bait, he went into the barn to watch operations, and in a few moments some crows alighted near it. One began cawing, and a flock of ten or twelve soon collected around, seeming to regard it with suspicion. After many motions and constant cawings, one pitched in and began to eat, which was a signal for the rest to follow. In a few moments the first fellow began to stretch and gape. Soon his wings partially fell. Others began to follow in the same way. Those less greedy took fright. No. 1 keeled over on his back; Nos. 2 and 3 also. Some fell twenty rods off; others fifty, and so on. Eleven were picked up in that haul or on that afternoon, from the effects of poison.

"Dead crows are constantly being picked up or found in the lots, supposed to be the effect of the poisoned wheat. I think it has had a very salutary effect, though it may be a dangerous resort. They appear to have grown shy and wary, seldom visiting the baited field a second time, and when done, is supposed to be by a new gang, unacquainted with the former tragedy."

This elicited quite a discussion upon the crow question.

Wm. S. Carpenter.—We have met with great success in our neighborhood in poisoning crows with strychnine in eggs—a kind of food that crows are fond of. Twine, if put up before the corn is planted, has been found effectual, but if not put up until after the crows have commenced, it will not answer.

F. A. Rockwell, of Conn., inquired what would prevent blackbirds from pulling corn. He had tried feeding them with sowed corn, and found it would not answer.

Dr. Trimble.—If any practical farmer is here, he will confirm my observation that crows do eat corn. The common blackbird does not disturb corn. It is the sort known as the Stirling blackbird—the one that often builds its nest in tall evergreens near the house. It is of large size, and is sometimes called the crow blackbird.

THE CATTLE DISEASE.

A letter from John G. Bergen, of Long Island, throws some light upon a subject now distressing the country:

"I regret that I will not be able to attend the meeting of the Farmers' Club to-day. I mean to say a few words in reference to the cattle disease now raging in Massachusetts and some other places, called pleuro-pneumonia. It will be a good subject for the Club. It is not a new disease on Long Island, as hundreds

of cattle have died with this disease within the last eight or ten years. I lost two out of three attacked, (my whole stock then,) about eight years ago. At that time it was very fatal. It has since either entirely disappeared in this vicinity, or cases have become so rare as not to attract public attention. I think Dr. Waters, of New Utrecht, L. I., could give valuable information, both with respect to statistics of this disease and its treatment, as his practice was extensive during its prevalence. Whatever may be the facts in reference to its recent introduction into Massachusetts direct from Holland, is it not strange that old Kings and Queens counties must be first in almost everything that is bad, as well as to occupy the advanced outpost in what is good in agriculture and its adjuncts? It was here that the Hessian fly, imported with the hired mercenaries of Great Britain who were engaged in the battle of Long Island, first made its appearance. It was here where premature ripe peaches first ripened to supply the markets of New York, indicating the disease called "Yellows." Without having any definite facts to bear on the order of time, I may add that the destruction of cherry trees, plum trees and their fruit, and the Newtown pippin apple (originating in Newtown, L. I.,) is more complete here than in any other section of the country; strong presumptive evidence that the great enemy of fruit, the curculio, first raised his standard and obtained a foothold on our island. I might add many other destructive insects, &c. of lesser note, many of which are now first becoming alarming at other points, old customers to us, some of which are already becoming the prey of parasites and remedies, and have ceased to be formidable. But I meant to have only called the attention of the Club to the cattle disease, which I have exceeded."

His allusion to the curculio waked up quite a discussion upon that subject.

THE CURCULIO.

Wm. R. Prince.—Sylvester Rowe, of Flushing, has tried experiments on plum trees for three years, to prevent the curculio, and has fully succeeded. Some trees that have not borne for ten years, after fumigation by Mr. Rowe, bore full crops of plums, while all around the trees were entirely denuded of fruit. Mr. Prince said that he was fully satisfied that the remedy was a sure one.

Dr. Trimble.—It is the old story. The curculio is here for six weeks, and no single fumigator will keep off this destructive insect. I don't believe there is any other remedy for this insect than the sheet, and shaking them off and destroying them day by day.

Mr. Prince said that Mr. Rowe fumigated a tree in bloom, and not since, and now the tree is full of fruit.

Dr. Trimble.—I found this morning in one garden some trees with all the fruit stung, and others with none stung; yet there had been no fumigation or remedy applied. That may be the case with the trees at Flushing. I think that soil has something to do with the curculio. At Hudson, N. Y., the subsoil is very stiff, and there plums grow well.

Mr. Prince.—If ground is paved under plum trees the curculio does not trouble the plums.

Mr. Carpenter.—In my neighborhood plums do best upon the heaviest clay land.

Mr. Gale.—I have succeeded in growing good plums in the door-yard, where fowls and pigs can destroy the infected fruit as it falls.

THE STRAWBERRY QUESTION.

Josiah May, jr.. of Harrison, Westchester county, twenty-seven miles northeast of here, exhibited several specimens of strawberries, among them the Wilson, fully ripe, and a new seedling resembling the Chocton, a prolific bearer, and good fruit, but not fit for a market berry, because it is soft when fully ripe.

Mr. Hite, of Morrisania, exhibited a remarkably fine specimen of Wilson seedling, very large and fully ripe. Also, a specimen of Scott's seedling, a very handsome, good berry.

P. G. Bergen, of Long Island, showed a variety of specimens of strawberries, but few of which were true to their name, according to the opinion of a number of gentlemen present, who are good judges. He says: The Wilson seedling is the best bearer, and ripens early and faster than any other that I know. This plant wants manuring more than any other. It is also a very early variety.

R. G. Pardee.—Varieties are often confounded by the runners of different plants intermingling. He related an instance of a prize awarded to one variety, when it was afterward proved to be another sort.

Andrew L. Fuller, of Brooklyn, exhibited several specimens from his garden—among them the Jenny Lind, which is a very early berry—in fact, the earliest—and a very excellent fruit. Another, exhibited as the Athlete, he said was nothing like what it was recommended. The Wilson, fully ripe, he said is the most productive, and will bear the most manure on the vines, and most sugar on the fruit of any other. The Bartlett, a new seedling, is a very productive sort, and good fruit. The flower is hermaphrodite. Mr. Fuller also exhibited thirty-two new seedlings, many of them of very fine appearance and high flavor.

Mr. Prince made a speech against the Wilson strawberry, contending that it cannot be what the public generally esteem it. He thinks that the Wilson produces too great an amount of bloom, and that owing to the sourness of the fruit, it will be superseded by some other.

Mr. Carpenter contended that the sort of Wilson strawberries grown by him were different and better than the sort grown by Mr. Prince.

John G. Bergen concurred in this opinion. With him, the Wilson is the most prolific of all others, and productive when grown in any manner, whether in hills or broadcast.

Mr. Fuller exhibited five varieties, brought in by his brother, who is foreman of T. W. Field, East Brooklyn, all ripe, to wit: The Iowa, Wilson, Hovey, Peabody, and a kind cultivated for the Hooker, but believed to be something else. Prof. Mapes said it was the Myatts Eliza. He did not think it a choice kind. The best of Mr. Fuller's exhibition were the Bartlett, and next the Jenny Lind, both of which are excellent. The Scott's seedling exhibited by Mr. Hite, were the best of that excellent variety that we have tasted. There is something in his soil or cultivation, that improves all his fruit. The Wilson strawberry exhibited by him would never be considered a sour variety nor lacking flavor.

Mr. Barnard, of Long Island, stated that he bought a thousand plants of Mr. Prince, for Wilson's, and he fully corroborated Mr. Prince in the opinion that the sort of Wilson Strawberries that he sells are not fit to cultivate; it produces a most worthless fruit.

Wm. S. Carpenter.—Thousands of acres are now being planted with strawberries, and the more that are planted the more fruit will be in demand. The Austin seedling is the strongest growing

plant in the whole family. I measured yesterday the foot-stalks of a plant of this variety, set out last October, over fifteen inches long. One of the plants has fifty-four berries growing, none yet ripe. The plants are remarkably strong-rooted, and the foliage is very rank.

Prof. Mapes.—I grow strawberries for market, and think the Wilson the most profitable of all the varieties. I let them make runners, and I use no animal manure.

A DRAINING MACHINE.

Prof. Mapes exhibited a model of a machine for laying drain tile by power, making the hole with a sort mole-plow, and filling it with round tile, wherever the soil is free of stones.

Adjourned.

HENRY MEIGS, *Secretary.*

June 18, 1860.

Present one hundred members.

Doctor Trimble, of New Jersey, in the chair.

Judge Meigs read the following communication from Mr. McElrath the Corresponding Secretary of the Institute, with a request, on the part of President Hall, to whom the letter was addressed, that the Club take action on so much of it as related to grains and seeds:

AMERICAN INSTITUTE,
NEW YORK, *June* 16, 1860.

To WILLIAM HALL, ESQ., *President:*

DEAR SIR—The foresight and liberal policy of our government, together with prudent negotiations and skillful diplomacy, have produced a wonderful change in the foreign intercourse and commercial policy of a hitherto inaccessible and strongly exclusive nation. The barriers, with which the people of Japan have for so many centuries entrenched themselves, are at last broken down. This innovation upon the sleeping population of that beautiful, far off land, communicating to it the world's knowledge and imparting vital action to its living masses, is among the grandest achievements of advancing civilization that has characterized the present century. The imposing Embassy from that distant eastern empire, now in our country, is the first bold step taken by the Japanese in the direction of social and political

comity with a foreign power, and is by far the most important commercial movement ever made by that singular people.

The immense extent and importance of the result which will follow this official visit, are not easily estimated or conjectured. The English language, we take it for granted, henceforth becomes a necessary part of the education of a Japanese official or dignitary, and very soon will be extended to other classes. With the language, will follow, slowly perhaps, but not the less certainly, the religion, the laws, the literature and the science of our Anglo American civilization.

The American Institute ought not to permit this great national event to pass unobserved or unnoticed. The commerce, the manufactures, the agriculture of the United States, are all affected by and involved in the treaty which this Imperial visit was ostensibly undertaken to exchange and ratify.

There is no record of the gradual improvements in agriculture or in the mechanical sciences of our countrymen, so full and complete as may be found in the printed reports of the Transactions of the American Institute.

A set of these Transactions, presented in the name of the Institute and placed for inspection and reference in the library of the chief officer of State in the Imperial Capital of Japan, will aid in producing a sympathy on the part of Japanese artisans with the mechanical industry of this country. The copious illustrations of agricultural implements and manufacturing machinery found in these volumes, will be readily recognized and understood by those ingenious people.

I propose, therefore, that a complete set of the Tansactions of the American Institute, bound in such a manner as will do credit to American book-binders, be presented to the Embassy through the officers of the Institute; and also that members of the Farmers' Club be requested to furnish seeds of any kind which they may think adapted to Japanese culture. I will cheerfully take charge of any packages, and see that they are properly delivered. The seeds should be accompanied with directions for planting.

The extended business discussions which took place at the last monthly meeting of the Institute, prevented me from bringing forward on that occasion the matters embraced in this communication. As no other meeting of the Institute will take place in time for any available action on the subject, I take the liberty of addressing you, as the head of the institution, trusting that if

the suggestions are approved, you will take prompt measures to have them carried into effect.

I have the honor to be, with great respect,

Your obedient servant,

THOMAS McELRATH,

Corresponding Secretary.

VACCINATION FOR PLEURO-PNEUMONIA.

Judge Meigs stated that Nicholas Wycoff, of Long Island, recommends vaccination of all cattle exposed to pleuro-pneumonia; and says that in one case where 100 head of cattle were so treated, only one died.

CRANBERRY CULTURE.

Solon Robinson stated that he had received a great number of letters upon the subject of cranberry culture since he made some remarks upon the subject a few weeks since. One of them from Springfield, Mass., he read as follows:

Dear Sir: Your experience in setting cranberries, I have read with much interest. I have a "patch" of a few acres, which was as unsightly as yours, a few years ago. I cut off the bogs and bushes, underdrained it, and have plowed and hoed it, but don't get much crop. I presume it needs more underdrains, though the crops near the drains are no better than those at a distance. I am somewhat discouraged as to getting anything in return for my outlay. Upon reading your article I doubted whether it was suitable for a cranberry swamp. Can you enlighten me? I could flow the whole for ten dollars. The muck was eighteen inches deep on an average when it was drained. The subsoil is a very hard sand, mixed with clay; it is so dry I can drive over it anywhere. This muck is composed of decayed trees, roots, grass, &c., on the top quite dry, but somewhat wet a little beneath the surface, and is valuable for spreading upon my upland. I have been in doubt whether to try to do something more with it, as it is, or spread it on my uplands. If you think it suitable for cranberries, I think it should all be set over. What work is there upon cranberry culture? I should not presume to send you this for your crowded columns, did I not think many more might be benefited by your reply.

Mr. Robinson remarked, that there is a good work at Saxton's on cranberry culture, written by an experienced cultivator on Cape Cod. I think the writer may, as I did, cart off much of his muck, and still grow cranberries. Perhaps to cart off muck and

cart on sand would be best. The only cultivation required is to keep the ground free of weeds until the vines get possession. Many farmers who have cleared off swamp-land experience the same difficulties. The land needs clay, lime, or ashes, or all of them.

The Chairman—Mr. Dye, of Cranberry, N. J., is one of the most successful cultivators of cranberries that I know of in any part of the country, and I think he would be able to give valuable information to any farmer visiting him.

THE STRAWBERRY FESTIVAL.

The exhibition of strawberries, to-day, was remarkably fine, and so large that only a portion of the exhibitors could find an opportunity to give an account of their mode of production.

METHOD OF CULTIVATION.

George H. Hite, of Morrisania, who is one of the most successful amateur cultivators of the strawberry in this vicinity, and who exhibits very fine specimens, read the following statement:

"I most cheerfully comply with your request to furnish you a description of my own practice in the culture of the strawberry. As there has been a great deal said about trenching, mulching, manuring, etc., I shall only speak of those things incidentally. Many beautiful beds of strawberries (to look at) are ruined by heavy applications of animal manures. The pistillate varieties do require stimulating manures; but as the most popular varieties at present are the staminate and Hermaphrodite, such as Wilson's Seedling, Longworth's Prolific, Hooker's Seedling, and Peabody's Hautboy, (all of which I have been successful in cultivating), I will confine my remarks to them.

"I would say that ground suitable for corn and potatoes, not lately manured, is best adapted to the culture of most varieties. It should be prepared by first spading deeply, then harrow or rake quite level; then, by line, make two rows fourteen inches apart, and, with the corner of the hoe, make miniature furrows about six inches deep, quite regular, from one end of the bed to the other; then take two and a half feet between that and the next two rows for an alley; and so on over the allotted space for the bed. Then procure some unleached wood ashes, or leached ashes, which are nearly as good, or a plenty of well sifted coal ashes, as a last resort, and sprinkle them all along the bottom of the furrow, say to the depth of one inch; then, with the end of

a hoe-handle, mix the ashes well with the soil, without changing the form of the furrow; then make holes fourteen inches apart, with a garden-trowel (not a dibble), along in the rows where the plants are to go. Set the plants carefully in these holes, so that their crowns will be two inches below the general level of the prepared ground—for the reason that when the plant has gained size and strength, it will admit of being hoed without drawing the earth from between the rows. The little edge or bank of ground left by the side of the furrow when it was made, will, as it is, from time to time, drawn into the furrow, during the first season's hoeing, enable the plant to put forth new roots above the first ones; and by fall the furrow will be, by this gradual process, completely filled up, so that the bed will present one level surface. Meanwhile bear in mind to pinch off the runners as they appear.

"As we do not expect much fruit the first season, I make it a rule to go all over the ground after rains, with a rake about one foot wide, with six inch prongs, to destroy any weeds that may begin to appear. I use the rake from the first; if the ground is pliant, it is certainly the best thing to use.

"The plants are now established and ready to be covered over, late in the fall, with hay or straw, or anything of the kind which contains no seeds; and over this pea-brush should be laid to keep it from blowing off. This process of covering answers many good purposes, among which are, it keeps the fruit clean, holds the weeds in check, retains moisture in the ground longer, and last, though not least, without it, in spring, the frost coming out of the ground is apt to crack the earth around the plant, and snap the spongioles or roots, which are of essential importance to the early bearing of the plants. It is necessary to part the straw from over the plants, and crowd it around the collars of the same when the season fairly sets in, and there let it remain until they are done fruiting—bearing in mind not to touch them with rake or hoe until they are done bearing. If weeds appear, pull them up while young.

When the plants are done bearing, the straw may be taken bodily from the ground, and the process of raking, spading in the alleys, and adding earth to the plants as they require it for the side shoots which each plant sends out, should be performed, as of course the roots are now nearer the surface of the ground. Hence the utility of planting as low in the ground the first year

as possible, so that the addition of dirt may be made without rendering the bed a mass of unsightly hills and valleys. But before adding the soil to the plants, sprinkle a handful of ashes around the collar of each plant; it is of great service to the side shoots in giving them a vigorous start for the next season's bearing.

"For the pistillate varieties, such as Hovey's seedling, Voorhees's &c., I use well rotted manure in connection with the ashes.

"I consider it as essential to transplant the strawberry as the cabbage-plant. The mode which has proved most successful with me is, to obtain the plants from an adjoining bed established for the purpose say about the first of August; take them up with a garden-trowel, with a ball of earth attached, and plant them carefully, as stated in the first preparation of the rows; and by fall they will be fine, vigorous plants, and will yield a fine crop of fruit the next season.

"The plan that I have heard advocated, of allowing the runners to take root between the old rows, for the purpose of renewal, is at variance with the principles of good strawberry culture. Let any one examine the roots of a runner, and it will be discovered that they are mostly on one side; therefore, when the runners are left to stand, they will send up their footstalks from that one side, and will seldom send out side shoots with any regularity, as a renewal of the plant. For, bear in mind one fact—that the crown of a plant that has sent out its footstalks, having been once laden with perfect fruit, will never bear perfect fruit afterward; consequently we must term it an annual, depending on its side shoots forming for the renewal of its growth. Thereby the necessity of adding earth yearly to each plant as above mentioned; for all the deep-trenching and manuring will never re-animate the main root of the crown which has once borne fruit. Let any one examine the root of such plant after the first bearing, and he will be convinced.

"But as to the effects of the transplanting, when a set is taken out of the ground the roots are a little shortened, which causes it to form roots equally on each side. Hence a beautiful plant will ensue with double the quantity of fine fruit, which is an ample reward for the difference of labor.

"Being actively engaged in my profession, my leisure is not sufficient to enable me to give you a detailed account of a mode of preparing ground, propagation, &c. But suffice it, for the present, to say that all vegetable manures are most suitable for

the culture of the strawberry—such as old leaf mold, earth from about old rotten wood, stumps, &c."

Mr. Hite then showed specimens of his fruit, and growing plants, to illustrate his mode of culture, showing how he produces new and vigorous plants for bearing each year. Andrew S. Fuller, Thomas W. Field, Wm. L. Carpenter, R. G. Pardee, and several others, who are very successful culturists of this fruit, agreed with Mr. Hite, that his method of cultivation is the best.

D. S. Barnes, of Brooklyn, exhibited a specimen of a strawberry, that bears very vigorously, the name of which he did not know.

The Chairman thought this was the Boyden seedling, a very delicious, mild berry, but rather a shy bearer.

Mr. Barnes stated that this was a prolific variety, as well as being excellent.

Thomas W. Field exhibited Wilson's seedling plant to show its average fruitfulness. This variety will bear any amount of manure. He says, I have Hovey's seedling that is imcomparably below Wilson's in productiveness. There is an advantage in renewing beds by transplanting, as practised by Mr. Hite. Hovey's seedling requires much manure, and high cultivation. Peabody's seedling wants high manuring, and is then a very shy bearer. My soil is naturally sandy and poor, and was thickly covered with clay and manured. I grow many varieties, and the Wilson is the most productive. One of the difficulties I have to encounter in growing strawberries near this city is the lawless disposition of trespassers upon my grounds. The Wilson seedling is not much more tart than other varieties. Its aroma is very fine. It will remain on the vine longer than any other variety that I know.

Dr. Habel, of Westchester county, presented several new seedlings. The berry is of large size and very prolific. Some of these were 1½ inches in diameter the largest way, and averaged 1⅜ inches.

COMMITTEE ON STRAWBERRIES.

On motion of Mr. Prince, a committee, consisting of Peter B. Mead, Lewis Roberts, Peter G. Bergen, Geo. H. Hite and Dr. Trimble, was appointed to examine and report upon the value and quality of the sorts exhibited.

MR. PRINCE'S COLLECTION.

Wm. R. Prince exhibited fifteen varieties, of each of which he gave a history, much to the interest and satisfaction of the club. One of these, the Ladies' Pine, he considered the best in flavor. It is of small size and not a great bearer. As to the color of the strawberry, he considers that the best that is most pleasing to the eye. He said that he has now growing in his garden 150 named varieties. The following is a list of them: Strawberries presented by Wm. R. Prince to-day: Prince's Scarlet Magnate, the heaviest of all strawberries; Prince's Scarlet Climax; Prince's Excelsior; Perfumed Pine, very high flavored; Le Baron, very high flavored; Ladies' Pine, highest flavored; Seraphine; Victorine; Sappho; Globose Scarlet; Imperial Scarlet; Huntsman Montevideo; Florence; White Alpine; Wilson's Albany.

He stated that all the large strawberries grown in Europe originated from American varieties.

FULLER'S SEEDLINGS.

R. G. Pardee.—I was at Mr. Fuller's garden in Brooklyn last Friday, and examined over a hundred sorts of seedling strawberries, and marked about thirty as worthy of cultivation. I was accompanied by several strawberry growers, who were highly pleased with the exhibition; and I now call upon Mr. Fuller to make a statement of his experiments.

Mr. Fuller then made an exhibition of one hundred and five distinct varieties of his seedlings, which originated from the Peabody, the Wilson, the Hovey, and a few others. Some of these are a decided improvement upon the originals. Generally, seedlings are small, but many of those exhibited were very large, and Mr. Fuller stated that some of them were quite prolific. Certainly, several of them were of a very beautiful color and excellent flavor. One seedling, exhibited last year as the Bartlett, is now called the Brooklyn seedling. This is a very fine berry, and a great bearer.

This exhibition of seedlings by Mr. Fuller was a very interesting feature of the exhibition, and his remarks were highly instructive. He said that to procure seed he takes the best berries he can get, and mixes them with sand, and then rubs the sand and berries together till the mashed berry and sand are thoroughly mixed, which he sows in a bed. When the plants are large enough, they are transplanted to the bearing beds, and

the runners kept carefully cut off. The seed-bed must be made in a shady spot, and kept well watered.

The Chairman asked Mr. Fuller if, among all his seedlings, he had got one superior to any other?

Mr. Fuller.—If I thought I had, I would not say so—there is so much humbug about introducing new things. I recommend the cultivation of seedlings, because we have not yet reached perfection in strawberries, and I do not despair in getting a new one as prolific as the Wilson and as high flavored as the Swainstone. The gentlemen who examined my seedlings, last week, decided that some of them possessed superior qualities. So I think, but I shall not name any of them until another year of careful trial. Then, if others still think them worthy of cultivation, they will be given to the public.

PRESERVED FRUITS.

L. H. Spear, of Braintree, Vermont, exhibited a number of specimens of fruits put up without sealing. They are cooked to about the same degree, and keep as well as fruits in sealed cans. The process is a secret, but is very inexpensive and efficient.

The strawberry question will be continued next Monday.

Adjourned.

H. MEIGS, *Secretary.*

June 25, 1860.

Present—58 members. C. M. Saxton, of New Jersey, in the chair.

JAPAN AND ITS TRADE.

The Secretary, Judge Meigs, read the following papers, upon trade with Japan:

A hasty remark last Monday, discouraging trade with Japan, induces me to say that our charter is to promote agriculture, commerce, manufactures, and the arts.

Our first duty is raising the best and greatest crops, and the next duty is to supply all nations from our surplus. One hundred years ago we sent to the world more breadstuffs than we did last year, and we were renowned for the results of our commerce with Indians for furs and skins! I see no reason then for neglecting the opening trade with the thirty millions of Japanese, any more than that with our savages, or that with thirty millions

of English in their island. Our trustees will send our transactions to Japan, and hope to have in return such of theirs as will help us to processes in gardening, farming, and to seeds and fruits, now unknown. Fortune for the London Horticultural Society, and Montigny from Paris, have derived some interesting plants from Japan, which are mentioned in our volumes.

Our Chamber of Commerce has entered into these questions of Japan trade with that sound judgment it always shows in matters of American commerce.

STUMP-PULLER.

Mr. Wyllis, of Orange, Mass., exhibited his model of a stump-puller, which is already well known to a part of the world, and from the course about to be pursued by the inventor, of advertising and exhibiting, we hope he will make it known to the other part, which we are willing to assure in advance, that there is no humbug about this valuable farm implement. It will root out the biggest stumps that can be found this side of California. There are some there a little ahead of this puller. The price of Mr. Wyllis's machine is $225.

SEED-BOXES.

Prof. Mapes exhibited a specimen of a new kind of cheap boxes, manufactured in Newark, upon a new plan, which he recommended as useful things to store away seeds. By a new patent contrivance, boards are cut about one-eighth of an inch thick, of suitable length and width to bend into forms for the sides of a round box, the largest holding about a peck, and eight others, smaller and smaller to form a nest. The ends are fastened together with some kind of glue, and the bottoms are fastened in by a rim of tin bent over the corner; and the lids are made in the same way, so that the ends may be of stuff but little thicker than the sides. The tin corners are great protectors against mice, as that is the only part of a circular box likely to be gnawed into, and this makes them quite safe for seeds, and better, as well as cheaper than tin boxes, and a decided improvement upon the old style circular wooden boxes, which have bottoms made of a half inch board, so as to nail in. We should think that half bushel and smaller measures, made up on the same plan, with iron, instead of tin covers, would be first rate. Will tin manufacturers take the hint and look to this?

CATTERPILLARS—A REMEDY.

Solon Robinson.—Wm. G. Le Duc, of Hastings, sends us a remedy for caterpillars and other insects, easily applied. It is kerosene oil. He says: Finding some large nests of caterpillars on my plum trees, I took a can of illuminating oil, as it is called, and applying a few drops, (sufficient to saturate the web of the nest (found that it worked like a charm. It is instant death to the vermin. Care should be taken not to apply it to the leaves of the plant or tree, as they will be scalded at once. I have but little doubt that in the hands of your careful experimentalists it will prove of value. The coarser oils of coal will no doubt be equally efficacious in many instances. I may as well mention here also that I have found kerosene oil a most excellent diluent of printers' ink, which I use in my flouring mill for stencil-plate marking. It would be a thorough cleanser of type, though perhaps not so cheap as potash.

Andrew S. Fuller stated that the worms in Brooklyn were so bad that the city councils were talking of cutting down all the trees in that city, to get rid of the worms.

Solon Robinson thought they had better cut down the boys who destroy the birds.

Adrian Bergen made a statement of the terrible destruction of the trees in Brooklyn. The linden appears to be the first kind attacked, and they soon denude the tree of all the foliage, and then attack other trees and strip them bare of every green leaf.

Prof. Mapes.—We are very free of destructive tree insects this year in New Jersey, but have a fair show of the other pests of the farm and garden, and we are obliged to resort to some remedy. We cannot grow early turnips without using something to keep the insects off, and I am glad that the necessity stimulates invention to assist farmers in the destruction of these pests. I have lately tried one called "attenuated coal tar," and find it effectual.

It is likely to be a very valuable aid to fruit growers and gardeners. It is in the form of powder, and wherever sprinkled upon insect infested plants, the insects leave at once. It is coal tar mixed with some substance so as to retain all its odor, and yet remain in the form of a dry powder.

THE PERSIAN INSECT POWDER.

Prof. Mapes said that a powder called by the above name is very effectual in destroying insects.

Wm. S. Carpenter thought that no bug powder would rid a farm of caterpillars. Something else must be done.

Wm. Lawton said that he had cleared his farm of tent caterpillars by pulling down the nests by hand, with all the worms in them, when they are easily destroyed.

THE LOCUST QUESTION.

A long discussion ensued upon the locust question between Prof. Mapes, Prof. Nash, Wm. Lawton, Wm. R. Prince, Doct. Trimble, Andrew S. Fuller, which was not particularly interesting to those present, nor would it be to others if reported. In fact, Mr. Fuller stated that there was not a schoolboy of any pretension, that had not read all about the locust—all and more than had been stated here, and that it was a waste of time to talk about them.

Prof. Mapes exhibited the effects upon branches punctured by the females to lay their eggs, but still thought without permanent injury to the trees.

Wm. R. Prince declared the whole theory of the seventeen-year locusts a humbug.

Prof. Nash thought they returned in some localities in thirteen years, and inquired if the nature of the soil had any effect upon their maturity.

VARIETIES OF THE LOCUST.

Andrew S. Fuller—We have many varieties of what are called locusts, among which are the Cicada Septemdecem, Cicada Canicularis, Cicada Rimosa, Cicada Marginata, Cicada Superba, Cicada Robertsonia, and perhaps several others. The habits of these are well known, and have been for many years. The seventeen-year locust has appeared regularly every seventeen years for more than one hundred years, as is well attested by numerous writers upon natural history.

GEISHARST'S COMPOUND FOR INSECTS.

P. B. Mead said that he has tried the above compound upon several kinds of insects, and found it sure death to all he had applied it upon. The objection to it is its high price—too high for common use; if it would rid us of the curculio it would make the plums too costly.

John G. Bergen—It is a fact that we have a prospect this year of a larger crop of plums than we have had in many years, and

therefore persons should be careful of their hasty conclusions about this or that nostrum driving them off.

Mr. Mead—The preparation I mentioned, dissolved in water and used as a syringe upon plum trees, had the effect to drive off the curculio, even upon one side of a tree, while the other was still infested.

THE STRAWBERRY QUESTION.

This question was called up at one o'clock, and William S. Carpenter was called upon to state some facts in regard to the great show of the fruit of the Austin strawberry, exhibited by him.

Mr. Carpenter—I got this at Watervliet, where it originated among the Shakers. I found it growing in the most common way, in masses and not in hills, without any particular care, and much injured from drouth. Yet, as will be seen, the size is large and the fruit solid enough to bear transportation, and as prolific as the Wilson, and the flavor will be generally preferred. The color is a bright scarlet. The time of ripening is after most other varieties are over.

To our taste this variety called the Austin is much like the Hooker. It is certainly a good flavor, but the berries are generally hollow, and we fear not hard enough for a market berry.

George H. Hite, of Morrisania, made another exhibition of the Wilson seedling, as grown by him, which are a little ahead of any other.

Prof. Mapes—The wild strawberries are a higher flavored fruit generally than the cultivated sorts. This is owing to the tannic acid in the vegetable matter. I once produced a gallon of tannic liquor from a tanner's vat, and mixed it with one hundred gallons of water, and used it upon my beds in the early part of the season, with remarkable effect.

Mr. Dykeman, of Hastings, exhibited some strawberries of a French variety, which are very much inclined to grow in a curious form—flat, and somewhat resembling the top of a cockscomb plant. It is a curiosity, and may be worth growing as such.

SPENT HOPS AS A FERTILIZER.

Wm. S. Carpenter stated that he had lately seen the effect of spent hops used as a mulch upon land with highly beneficial effects.

Prof. Mapes—This substance has been largely used in England,

and is very much approved. He thought that in consequence of the tannic acid, this substance might be a good mulch for strawberries.

A NEW STRAWBERRY.

Solon Robinson—Stephen Estes, of Milford, Otsego county, wants to know if any of the Club can tell the variety of strawberry of some leaves he sends. It is called a Hovey seedling, but is doubted, as it bears a rather sweet, large berry. He says:

"It is a very profuse bearer. The stem rises about five inches high before it branches. The berry has about twice as many berries on a stem as the Albany or Wilson seedling, standing by the side of them. The first that was known of them, a gentleman here found one plant in the corner of his garden. Whether it had been brought there, or was a seedling, I cannot tell. We would like your opinion of it."

Mr. Robinson said in answer—No doubt it is a seedling, and it should be submitted to the inspection and criticism of some competent judges.

FRUIT GROWING IN OTSEGO COUNTY.

Mr. Estes also inquires:

"Can we raise the Lawton blackberry and Delaware grape up here in Otsego county? This is eight miles south of Cooperstown, about the latitude of Albany, but much higher land.

"I see you have been planting a piece of swamp land to cranberries. Does the ground have to be plowed during any portion of the year? If you will have the kindness to answer these questions you will greatly oblige."

Mr. Robinson said: I have no doubt that Delaware grapes and Lawton blackberries will grow there, with good cultivation and sheltered situations, to perfection. The cranberry ground may or may not be plowed. It is an advantage to plow it to keep off spring frosts. Adjourned.

HENRY MEIGS, *Secretary*.

July 2, 1860.

Present—62 members. C. M. Saxton of New Jersey, in the chair.

The business of the meeting was opened by the Secretary, Judge Meigs, who read a translation from a Russian paper about

the visit of Victor de Motshussky to the Caucasus, in pursuit of his favorite study of natural science. His investigations have developed several insects new to science.

The Secretary also read an account of Russian agricultural implements, which shows how much ahead this country is of that in improvements for the farmer.

THE LOCUST.

Dr. Trimble of New Jersey gave another lecture upon the locust, showing how the insect deposits its eggs in the limbs of almost every variety of trees. A great number of these twigs were distributed among the company to show the curious manner in which the female deposits its eggs. He also gave an account of a maple tree in Newark, which appears to have a sort of Bohonupas effect upon flies; they lay dead by thousands under this tree.

THE CURCULIO.

Dr. Trimble showed also a variety of specimens of fruit punctured by the curculio, and other specimens in contrast, that had been destroyed. He thinks the curculio as abundant as ever, but in consequence of the abundance of the crop the insect is not able to destroy all, and consequently we shall have a great crop of fruit.

BIRDS.

Mr. W. S. Carpenter called attention to the late act of the Legislature for the protection of birds, and remarked: judging from the constant cracking of fire-arms aimed at small birds in the country, by straggling loafers and boys, leads us to conclude that the act passed by our Legislature last winter for the protection of small birds is almost entirely disregarded, one section of which forbids the killing at any time of the nightingale, night-hawk, blue bird, yellow bird, Baltimore oriole, finch, thrush, lark, sparrow, martin, swallow, &c., and the killing of the robin or bobolink between the first day of February and the first day of September, under a penalty of fifty cents for each bird killed. The reason for the passage of this law is to secure the agency of these birds in preventing the increase of noxious insects.

It has been urged that the robin was so destructive to cherries and strawberries as to justify its destruction. This opinion J. W. P. Jenks of Middleboro, Mass., has successfully refuted. The plan adopted by him was to obtain birds at daybreak, mid-

day and sunset. The specimens were taken from village and country, and he examined the contents of their crop. He demonstrated conclusively that insects injurious to vegetation constitute the natural and preferred food of the robin, and that during two-thirds of the year the bird takes no vegetable food whatever. Whenever vegetable food was found in the body, it was only in limited quantities, and mixed with insect food. This was only in the months of June, July, August and September, and then the vegetable products consisted mainly of elderberries and pokeberries. The edible fruits destroyed were in too minute quantities to warrant complaint.

I hope that some steps may be taken by the Farmers' Club of the American Institute to induce our next Legislature to enact such laws as will prevent the destruction of the robin and bobolink and all other small birds that may be considered as agents in destroying the numerous insects that appear to be so alarmingly on the increase, and in consequence of this increase of insects the lover of pomology and agriculture is often disheartened from the almost total destruction of the fruit of his garden and the promising fields of grain. The great loss sustained by the country in its productions compared with the small gain of the sportsman in destroying the birds should cause laws of such stringency to be enacted as would prevent any further destruction of these birds.

If we fail to obtain protection from our Legislature, I would advise the planting of trees around our dwellings, and I should recommend the evergreen being extensively planted. I have hundreds of these trees planted. My neighbors have but few birds near their gardens, their grounds being nearly destitute of trees. Their gardens are the safe home for the insect to commit its depredations.

The evergreen is a favorite tree for these little songsters, their thick boughs affording them a favorite place to build their nests. On one Norway spruce tree, planted out eight years ago, I counted four robins' nests, the owners successfully bringing up their families; and by encouraging their familiar habits I have largely increased their numbers, and the perceptible decrease of insects in my garden convinces me of their great value to the country.

Solon Robinson read the following which elicited an extended discussion.

THE PEACH GRUB.

Here is a subject for discussion, which, if it should elicit a remedy, would be interesting to everybody. The letter is from East Wilson, Niagara County, N. Y., and having the great merit of being brief and to the point, I will read it. The writer says:

"A large and interested community, comprising at least *five thousand* peach growers in this county, ask for *light*. What can be done to stay the ravages of the red-headed *peach-grub?* Dig him out and kill him will only insure an armistice for about ten days; fresh wood-ashes applied to the trees only seem to sharpen his appetite for destruction. Hundreds of orchards and thousands of trees are dying from his operations. There are half a million of peach trees in this vicinity suffering from this pest. Will tar prevent his operations? and will it injure the tree? Can you or any of your numerous readers or correspondents tell us of any specific which will kill the grub without injuring the tree? If you can do so, you will confer a substantial favor upon many hundreds of your readers."

Andrew S. Fuller.—The best remedy is to preserve the birds—the natural insect destroyers. It is their decrease that has increased destructive insects.

Wm. Lawton stated that he had taken great pains to preserve birds around his place, and was now reaping the benefit. As to any outward application to kill the peach-worm, he did not know of anything that would destroy it without destroying the trees. If the worms are dug out, and a plaster of soft cow manure is applied, the tree may recover. It is a very tedious operation.

WRENS.

The Secretary advocated the cultivation, or rather protection, of wrens and insect-destroyers.

Mr. Fuller said that the wren was a mischievous bird, and destroyed the eggs of other birds.

DISEASE OF CHERRY TREES.

Solon Robinson read a letter from A. Langdon, Belmont, Allegany County, N. Y., asking for a remedy for the disease of cherry trees that exude gum, and finally crack open and die.

Wm. Lawton said that cutting out the gum-spots very carefully, not to injure the inside bark, and it will work a cure. The cause is an excessive growth.

Mr. Carpenter said that he had slit the bark of diseased trees in the longest days in Summer, and they healed without injury, and that was his remedy for the disease.

Andrew S. Fuller.—The bark of a healthy tree does not need cutting—the disease that causes them to crack open, shows that the bark is unhealthy and needs cleaning. There is something about the kind of stock that cherries are growm upon. The Mahaleb stock is a very bad sort to grow grafts upon, they will almost always become diseased. I would never cut a tree to cure the disease alluded to—I would clean off the moss and get the bark smooth and healthy by other means, and thus cure it of this and other diseases. Perhaps the difficulty all comes from the graft out-growing the stock—then, it is incurable.

John G. Bergen.—Last Winter one of my cherry trees bursted by frost. Now that is a sort of cracking open that cannot be cured by slitting of bark, nor washing and cleaning it.

Dr. Trimble.—This bursting of bark in Winter is easily accounted for; but I can give no information about the disease spoken of in the letter, but judge it must be, as it is in Winter, from natural effects of contraction and expansion, and not by any disease.

No remedy of easy application was given for the trouble spoken of. The following is the letter alluded to, dated:

"BELMONT, N. Y., *June* 30, 1860.

"Dear Sir: Will you allow me to ask of you or the 'Farmers' Club,' if you know of any remedy for the disease of Cherry Trees in which the bark bursts, and is accompanied by a discharge of gum. We have lost one valuable tree and several others are badly diseased. If you can give us any information, either by letter or through *The Tribune* report of the Club, whereby we can save them, you will greatly oblige

"Yours very respectfully,

"A. LANGDON."

PRESERVING FENCE POSTS.

Solon Robinson.—D. Edwards of Little Genesee wants to know how to preserve fence posts from decay. After all that has been said and printed how to do it, there are a few left that don't yet know how, for Mr. Edwards proposes to do what will be more expensive than the right way. He says:

" My posts are cherry, cut in the Winter; they are about 4 feet

out of the ground. I have bored a $1\frac{1}{2}$-inch hole, from the top down, 22 inches, which I propose to fill with salt, sulphate of iron, and sulphate of zinc, or some other substance or preparation, if you so advise. Are the holes bored down far enough?"

I should say, quite far enough; in fact, just 22 inches too far. Instead of putting the sulphate of zinc in the holes, if he will put one pound into twenty quarts of water, and set the green posts in it as deep as he will set them in the ground, until they are well saturated with the liquid, and they will probably last longer than the owner.

THE MEASURING WORM.

Mr. Trimble.—The Lindens of New Jersey, in former years have been very much affected, but this year they have not been affected. I believe the insect has been destroyed by parasites, and I hope it will be in Brooklyn. I hope that no one will think of cutting down trees to get rid of the worms.

J. G. Bergen stated that the worms in Brooklyn have already ceased their ravages for the season. It was the Mayor of Brooklyn who recommended the trees to be cut down—no doubt an effectual way to get rid of the worms.

Wm. S. Carpenter presented another large show of the Austin Strawberry. These were picked on Saturday, and sent from Watervliet, and arrived in tolerably good order They are rather too soft for transportation as a market berry, but will be valuable to cultivate for family use, being so late in coming to perfection. These were the only strawberries exhibited, except a few by Mr. Fuller of the Brooklyn seedling, which is still in perfection, and some new White Alpines.

CHERRIES.

There was a very fine exhibition of cherries, and an interesting discussion upon the varieties.

Mr. Lawton.—The black Tartarian is a good sort, but I prefer the black Eagle; it is a very hardy variety, and very productive. The English Morello is an acid cherry, and the tree very free from insects. We have not had a rose bug with us this year.

Solon Robinson stated that, only five miles from Mr. Lawton, the rose bugs infested his cherry trees by myriads, destroying more than half the fruit. Mr. R. inquired of Mr. Lawton what it was that eat his cherry leaves, if it was not rose bugs?

Mr. Lawton reiterated that it was not rose bugs—that none were to be seen there.

CHERRIES FROM IONA.

Mr. Fuller exhibited 18 very fine varieties of cherries from Dr. Grant's garden on the island of Iona, on the Hudson, near Peekskill. Mr. Fuller gave short sketches of the history and quality of the various sorts, which were not only very interesting but instructive. The kind called "Gov. Wood cherry" was spoken of as the finest of all the new varieties. Nearly all the Bigarreau varieties are too sweet for cooking.

THE WHITE ALPINE STRAWBERRY.

Mr. Fuller then showed a basket of White Alpine strawberries, a new seedling, but much like if not identical with the original. It is well enough to cultivate them for variety, and for late production, but the fruit is small, and the vines not productive.

SEEDLING GOOSEBERRY.

Mr. Carpenter exhibited a specimen of a new seedling gooseberry, orginated upon Staten Island, which grows free, so far, from mildew.

Gooseberries and currants are to be exhibited and fully discussed at the next meeting, when this new seedling will be reported upon by a Committee.

LONG ISLAND POTATOES.

John G. Bergen exhibited specimens of Long Island potatoes, of large size and nearly ripe, of this year's growth. He stated that the crop was very fine this year, and is now coming into market in great abundance.

VISIT TO PROF. MAPES'S FARM.

John G. Bergen read the report of the committee which visited Prof. Mapes's farm last week. The report speaks in the highest terms of the manner in which that farm is managed by Mr. Quinn, the foreman, and its great productiveness.

Adjourned.

H. MEIGS, *Secretary.*

July 9, 1860.

Present—60 members. Thomas McElrath, Corresponding Secretary of the Institute in the chair.

DOMESTIC WINE.

The Secretary, Mr. Henry Meigs, read a paper from New Harmony, upon the subject of wine-making, which contended that wine made with the use of sugar should not be denounced as *impure*. The writer thinks that wine made with sugar is often a more healthy beverage than wine without sugar.

INSECTS UPON CHERRY AND ROSE TREES.

William Lawton showed a number of roses and cherry limbs, showing the marks of an insect like those made by the rose-bug, but not made by that commonly known as such. He also showed white roses from a bush that heretofore bore roses tinged with red, generally single. Now they are quite double. He called this a Greville rose, which Mr. Fuller denied. He said that it had not the distinctive mark of the Greville rose in the leaf.

PARSLEY-LEAVED BLACKBERRY.

Mr. Lawton exhibited a specimen of the parsley-leaved blackberry—an old variety, and not particularly worthy of cultivation. It won't bear training.

CURRANTS.

Mr. Lawton showed specimens of the productiveness of the old Dutch currant, which he thinks superior to all others for every day use.

GOOSEBERRIES.

For eight years, Mr. Lawton said, the mildew has not troubled his gooseberries of the red variety. Mr. Lawton also showed bushes badly mildewed, which he attributed to neglect. He cuts out all two year old wood, to get rid of the mildew. He thinks that the best varieties of English gooseberries may be cultivated free of mildew upon a clayey loam well mulched, so as to keep the ground moist. Never use horse manure, nor any other liable to heat.

STRAWBERRIES.

William S. Carpenter showed some fine specimens of the new Austin strawberry, which is still in full bearing, and likely to continue in bearing through this month. These berries are certainly fine flavored and valuable for home use, coming later than any other. We fear they will prove too soft for market berries, except at short distances.

OTHER FRUITS.

Mr. Carpenter also exhibited a variety of currants, cherries, and raspberries. The Cattawissa raspberry bears better this year than ever before. It is an ever-bearing variety—the best crop in October.

CURRANTS, HOW TO MAKE THEM BEAR.

George H. Hite made an exhibition of some remarkably fine Dutch currants, and in answer to the question stated that he produces them by careful trimming, cutting in the ends of the limbs in early spring, and cutting away all three-year old wood. He also cultivates the ground by hoeing very often. He also showed some very remarkable specimens of limbs of cherry currants loaded with fruit, and stated that this kind of currants must never be pruned, if it is desired to produce fruit in the highest perfection. The bushes will not bear pruning like the common sort. He has to tie up the bushes to stakes as they grow limbs six feet long, and are very productive. Mr. Hite's exhibition of fruit was exceedingly interesting and his remarks instructive. Several sorts of gooseberries shown by him were remarkably fine.

CURRANTS AND GOOSEBERRIES.

Andrew S. Fuller exhibited specimens of white Holland currants, which grew upon very strong upright stems. The yellow Imperial currant, exhibited by Mr. F., is a new variety, very handsome, and fruiting for the first time this year. The red Imperial he also considers a very superior though not any better, if as good, as the Versailles, which is an excellent flavored, large-sized red currant. So is the red Angier. Mr. Fuller made the following remarks upon the currant and gooseberry question:

The English varieties of the gooseberry have never succeeded in this country, only in prescribed localities, and we doubt if they ever will. In fact, there is no place on the Eastern continent where the gooseberry has been brought to the perfection that it has in England. In Italy, where it is found in its wild state, it has never been cultivated to any extent, or thought worthy of it. In Spain it is scarcely known; in France it is but little esteemed; and in no country does it thrive so well as in the humid atmosphere of England. And it is to this perfect adaptation of the climate to the plant that we owe the great improvement in this fruit more than to the skill of the cultivator In Holland and some parts of Germany they have cultivated it

with success, having a climate milder than that of England with much of its humidity. To succeed with them here we must plant them upon soil that is cool and moist on the north side of a hill or a cool and half-shady place, and then keep the bushes properly pruned; for under such circumstances we have seen abundant and regular crops for years in succession. If our cultivators would take our indigenous varieties, (of which we have some twenty), and many of them superior to the native European variety, and sow the seed, and by so doing improve them, we should soon have varieties of this fruit that would be equal if not superior to any imported variety. Besides being native, they would be exempt from those diseases which we have to contend with in the cultivation of the foreign kinds. The currant seems to succeed everywhere, and perhaps there is none of our fruits of which there are more distinct species and varieties found growing wild in different parts of the world than there is of this plant. North America alone furnishes some fifteen or sixteen indigenous varieties. But the varieties mostly in cultivation are of the European species, and which were grown from the old red, white, and black currants of that country. The English gardeners have had the currant in cultivation for more than three hundred years, without making any improvement upon it, although Mr. Knight, in 1810, raised many seedlings, some of which, at that time, were thought to be improvements upon the present varieties, but as soon as they were neglected, or given no better cultivation than the older varieties they were found to be no better. And we believe that if many of our new fruits were given no better care than the older ones, they would soon be found to be no better. But when we get a new plant, and perhaps pay a large price for it, we feel bound to give it extra culture, and by so doing we get extra results, and this leads us to believe that it is in the variety, when the truth is that it is only the effects of extra cultivation. The French have been very successful in producing new varieties, and to them more than to any other nation are we indebted for improved varieties of fruits of all kinds, and our best currants among the rest. If we were called on at this present time for a list of currants, and be governed by our own experience, we should give the following, and their relative merits as to size, quality, and productiveness, in the order in which they stand : La Versailles, red; Imperial Rouge, red; Imperial Jaune, pale yellow; White Grape, white;

Cherry, large red; White Provence, white; White Dutch, white; Victoria, La Hative, La Fertile, Champagne, Red Dutch, Red Provence—valuable only as a curiosity—Striped Fruited, for same. We have several new varieties, such as Attractor, Gloire de Sablons, &c., which we have not fully tested yet; some of them, without doubt will be good, and perhaps supersede some of the other kinds. The best variety of black currant is the Black Naples. The effect of good cultivation of currants is shown by those of the true Dutch variety, exhibited by Mr. Hite, who gives his bushes good care, instead of leaving them, as most people do, to take care of themselves.

R. G. Pardee.—I believe that good cultivation and care will enable any one in almost any locality to grow good gooseberries free from mildew. In this I differ from Mr. Fuller, as I don't believe that it is necessary for us to resort to the native sorts, but we may at once procure the very choicest English varieties, like some of the beautiful specimens exhibited here to-day. I speak advisedly, when I say that I know that all the best varieties of English gooseberries have been and can be cultivated upon the renewal system, and mulching and not hot manure, so as to produce the finest fruit free of mildew. Mr. Pardee indorsed the fine flavor of the Versailles Currant, and also the white Provence, the white Gondolier. He thinks the best gooseberry is Crompton's Sheba queen. He earnestly recommends every one to make an effort to grow the very best kinds of gooseberries, as well as every other kind of fruit, and thinks that nothing is better calculated to encourage it than such exhibitions and conversations as this.

Andrew S. Fuller.—I wish to guard people from the idea that they will get an improved variety of fruit by purchasing that which has given remarkable results from very high cultivation. The currant will grow and produce fruit in almost any locality, badly neglected; but the gooseberry will not grow in that way. I know that the English gooseberry has failed in most places under ordinary cultivation. But we have some very good native gooseberries, that are perfectly hardy, and some of these have been greatly improved, and I hope others will be, until we have a native gooseberry as hardy as the wild one, and as good as the best English ones, which are all seedlings from wild sorts, common in Piedmont and France.

REMEDY FOR ROSE-SLUGS.

Geo. H. Hite.—I have found an effectual remedy against the depredations of these pests, in sifting dry dust upon the bushes. It is just as good as snuff, or any other bug powder. Of course it wants frequent renewal.

DEATH OF JOHN A. BUNTING.

At this stage of the meeting the Chairman rose and made the following statement:

Information has been received of the death of the first vice president and one of the most active and influential members of the American Institute, John A. Bunting, Esq. In the death of Mr. Bunting, the Institute has lost one of its most judicious advisers—one of its most efficient officers. His funeral will be attended by the members in a body, who will meet for that purpose at the rooms of the Institute to-morrow, Tuesday, at 3 o'clock, P. M.

Upon this the Secretary moved that out of respect to the memory of Mr. Bunting, the club now adjourn, which was at once concurred in, continuing the questions before it to the next meeting, which will be on Monday next, at noon.

HENRY MEIGS, *Secretary.*

July 16, 1860.

Present, 35 members. Mr. E. Doughty in the chair.

Judge Meigs, the Secretary, opened the proceedings by reading the following paper. We hope it may lead to action in this direction for the increase of human food:

FISH PONDS.

In the West Indies, fish and turtle are constantly kept and stall-fed. At free running they never become fat, any more than our land stock. The ponds are constructed of stones of irregular figure in wall, so as to retain three or four feet of water at the lowest tides. The water of the rising tide flows freely in. These ponds have a deck of plank over them laid about two inches apart for admission of air and light. A hatchway in the middle of the floor, opened to throw in their flood, which usually consists of fry, or small fish, taken by cast nets in any required quantity. When this is scattered among the fish, the excessive

eagerness of the fish is an interesting sight!—their bright eyes, fine teeth. Often do they leap out of water to catch the falling bait.

The housekeepers send for a suitable fish for dinner shortly before the time to cook it. The person has a strong line and hook, with or without bait; he lets it down and the fish rush toward it, and he must be expert to let it drop to the mouth of the Grouper, Hamlet, Snapper, White or Blue Band Porgie, &c., which he wants. Such a fish never appears on the tables of the Northern States, and yet every town on our sea coast ought to have them. And when the poor fisherman has caught more than he can sell, he loses often greatly. Whereas the pond would be a sort of deposit bank, always ready and better fish. I have tried it on our shore, feeding the fish with clams, fattening them in a fortnight.

Mr. Rockwell, of Connecticut, addressed the Club in favor of wine-making of common grapes, and other fruits, by adding coarse sugar to the juice. He contends that Connecticut wild grapes will make as good wine as can be made from the Delaware grapes.

Mr. Steele, of Connecticut, contended that grapes can be cultivated so as to ripen four weeks earlier than ordinary, and sufficiently ripe to make good wine, without sugar.

Dr. Trimble, of New Jersey, contended that all the sweetened beverages that he had tasted lacked but one thing, and that was the taste of wine.

Andrew S. Fuller—Mr. Rockwell insists that fermentation of sugar does not produce alcohol. He is mistaken; fermentation produces it, and distillation separates it. This sugared wine is not pure—it is one-fourth alcohol. Much of the imported wine is sugared. Some of the best wine cannot be imported; we cannot move from place to place the very best wines made of pure grape juice.

Mr. Gale—Last season I had a small grape vine which I fed with liquid manure, while another vine in the next yard was not fed. From my vine I got half a bushel of excellent grapes, while my neighbor got none.

Mr. John Chappellsmith, of New Harmony, Indiana, communicated the following, on

THE CHEMISTRY OF WINE MAKING.

Wine, in its absolute sense, is understood to mean the result of transformations in the constituents of the juice of the grape, by vinous fermentation. The essential constituents for making wine are sugar, gluten or albumen, free tartaric acid and water; these exist in the juice of the grape, and when the sugar and the acid have been transformed by fermentation, the juice acquires the peculiar properties of wine; for, in the process of fermentation the sugar has been transformed into alcohol, and the acid into certain substances which give to wine its peculiar taste and smell.

The proportion of sugar and of acid in the juice varies according as the grape is grown in a southern or a temperate climate. But the gluten appears to be a constant quantity in whatever climate the grape be grown. In southern climates the juice contains more sugar and less acid than the juice of grapes grown in temperate climates; and the wine, though sweet, has not any odor. The juice of the grape grown in temperate climates has more acid and less sugar, but the perfume is intense; and hence, as Liebig states, the connection between the acid and the characteristic perfumes of the wine, can scarcely be doubted.

If the oxygen of the atmosphere be completely excluded from grape juice, its constituents will not undergo any perceptible change; but if it have access to the juice, the oxygen will immediately act upon the gluten, and decompose it; and the gluten, in the act of decomposition, will communicate its state of change to the sugar with which it is in contact, and transform it, that is, split up the atoms of sugar into alcohol and carbonic acid, provided the temperature does not exceed 80 or 90 degrees. At higher temperatures, the action of the gluten transforms the sugar into carbonic acid, mannite, lactic acid (acid of sour milk) and gum, instead of alcohol.

Fermentation, putrefaction and decay are all processes of decomposition, but giving different results. The two principal constituents of grape juice on which fermentation depends, are the gluten or albumen, and sugar. Sugar is called a non-nitrogenized substance, and is composed of oxygen, carbon and hydrogen; gluten is called a nitrogenized substance from its containing, in addition, nitrogen; it also contains sulphur. The latter elements, says Liebig, are the true excitors of fermentation, that is, the transformers of non-nitrogenous substances. So long as glu-

ten, in a continuing state of decomposition exists side by side with sugar in a fluid, fermentation proceeds. While oxygen is excluded, both these processes of transformation, namely, that of the gluten and that of the sugar, complete themselves side by side, and mutually limit each other; so that if the transformation of the sugar into alcohol be completed before that of the gluten, as happens in grape juice poor in sugar, a certain portion of the gluten or ferment, as it is called, remains undecomposed, without undergoing further alteration, so long as the access of oxygen is thoroughly precluded. If fresh sugar be added to the juice, it possesses the property of again passing into a state of fermentation, and if the transformation of the gluten is completed before that of the sugar, the still undecomposed sugar remains unaltered, as in the wines of southern countries, which are generally sweet.

But if oxygen have access to the wine, as it will have, even in a closely bunged cask, through the pores of the wood, then, if there remain in the wine any undecomposed gluten after all the sugar is transformed into alcohol, the presence of the decomposing gluten transmits its action to the particles of alcohol, and transforms the alcohol into acetic acid; the wine becoming sour, that is, converted into vinegar.

If, however, the fermentation or decomposition of the gluten be carried on in wide, open, and shallow vessels, at a temperature not higher than fifty degrees, the gluten will be decomposed and separated from the wine by precipitation; and the wine may afterwards be exposed to the air at any temperature, for any length of time, without becoming acid.

It may now, says Liebig, be easily understood that we can exercise a decided influence on the juice of the grape. We may rationally improve a *must* (juice) in which the gluten is in excess, by the addition of sugar; and it is a matter of perfect indifference that this sugar has been produced from the organism of some *other species* of plant, and added to the juice of unripe grapes. In a scientific point of view these are real improvements, which have nothing in them very recondite, very difficult of comprehension, or objectionable.

The application of this knowledge respecting the phenomena attendant upon fermentation and decay is obvious and easy. We see that the conversion of wine into vinegar, when the wine is in contact with air, depends on the gluten undergoing decomposi-

tion by absorbing oxygen from the air; and that this gluten, in the act of decomposition, has the power to transmit its aptitude to absorb oxygen to the particles of alcohol in contact with it in the wine; and that if this decomposing gluten can be completely removed, the wine loses the property of acidifying, or of being converted into vinegar.

The excess of gluten, which exists in wines made from grapes grown in temperate climates, can be obviated by instituting the conditions which exist in the juice of the grape grown in southern climates, which is so rich in sugar that a considerable amount of it remains in the wine when the fermentation ceases, owing to all the gluten or ferment having been decomposed, and completely separated in an insoluble form as yeast. Such wines alter very little when exposed to the air. Now if to the juice of grapes grown in temperate climates, which is poor in sugar but rich in ferment, sugar be added, then as soon as all the gluten is decomposed the wine has not any tendency to pass into the acetous fermentation.

But if sugar be not added to juice, poor in sugar, and the undecomposed gluten still remains in the wine after all the sugar has been transformed into carbonic acid and alcohol, then the remaining gluten, in its decay, will disturb the alcohol in contact with it; and, by an indirect process, cause it to absorb oxygen, and thus transform the alcohol into vinegar, unless the fermentation be carried on, and the wine be stored in cellars, the temperature of which is always below fifty degrees. It is under this latter condition that the celebrated Bavarian beer is manufactured. It has been found that the transformation of alcohol into vinegar takes place most rapidly when the alcohol is in contact with gluten in a state of decay at a temperature of 95 degrees. At lower temperatures the affinity of alcohol for oxygen decreases, and at from 46 to 50 degrees alcohol ceases to combine with oxygen, even in the presence of decomposing gluten. The gluten, however, at this low temperature, retains its power of absorbing oxygen in the process of its own decomposition.

If grape juice deficient in sugar be fermented after the method of manufacturing Bavarian beer, in wide, shallow, open vessels, under a temperature of less than 50 degrees, a more or less complete separation of the excitor of acidification (the gluten) takes place simultaneously on the surface and within the body of the

liquid; the test of separation being known by the liquid becoming clear.

But this method of removing the acidifying substance from wine by fermenting in cellars of this uniform low temperature is not applicable to domestic wine making, because such cellars are very uncommon. The domestic maker of a "palatable and keeping wine," must add sugar to the juice of ripe grapes of temperate climates in the proportion judged necessary by the amount of gluten, and by the desire to have a dry or a sweet wine, so that a more or less quantity of sugar shall remain in the wine after all the gluten has been transformed or separated. Or another method may be followed which has many advantages, and which is indeed the only one applicable in such a State as New York, where it is said grapes scarcely ever ripen, which is, to add sugar and water to mature but unripe grapes.

The consideration, however, of the superiority of the economical and important method of wine making must be deferred until my next, when I will consider it in connection with what is termed pure wine, and its physiological influence upon the human system.

What constitutes pure wine is a vexed question. The Ænologists, that is, the men practically versed in wine-making, and the men who have scientifically studied the chemistry of the art, hold totally opposite opinions. The wine manufacturers, of Ohio for instance, regard pure wine as consisting of the fermented juice of the grape only; any addition whatever thereto, being considered an adulteration, which renders the product unworthy of the name of wine. Mulder, the celebrated professor of organic chemistry, favors this opinion, and is disposed to regard everything that is added to, or taken from fermented grape juice as an adulteration. Not only is he disposed to regard such substances as sugar, when added to the juice of unfavorable seasons which is deficient in sweetness, as an adulteration; but such substances as isinglass, when used for the purpose of merely clearing the wine. He admits, however, that this practice is not generally so understood; and that, therefore, he has not the right, which he regrets, to stigmatize the practice.

We have, then, the admission of Mulder that the practice of adding sugar to grape juice deficient in sweetness, is not generally understood by Ænologists, to be an adulteration; and, in support of the opinion, that the addition of sugar is not an adul-

teration, we have the authority of a more celebrated professor of organic chemistry, that of Liebig, who has thoroughly studied the chemistry of wine-making. Liebig, as I have previously stated, declares that it is a rational practice to improve grape juice deficient in sweetness by the addition of sugar; and that it is immaterial, as regards the quality of the wine, from what source the sugar is derived, which Mulder admits, for he says that when the fermentatian is completed the added sugar cannot be detected.

If, then, sugar when added to grape juice cannot be detected after fermentation, and if it is immaterial from what source the sugar has been derived which gives to wine after fermentation one of its important constituents, there can be no chemical objection to the use of sugar in wine-making.

I will now consider the physiological objection put forth by Mr. Fuller, at the meeting of the New York Farmers' Club, previously referred to. Mr. Fuller said: "Grape sugar and cane sugar are chemically different, therefore we conclude that the alcohol produced by the fermentation of the two is different; we know that they act different upon the human system." What authority has Mr. Fuller for this? Mulder and Liebig both show that the addition of sugar cannot be proved by analysis of the wine, which would be false, could a difference be detected in the alcohol. I do not think that any medical or physiological authority exists for the statement that the alcohol produced from grape sugar, and the alcohol produced from cane sugar operate differently upon the human system, whether used either as an exhilarating or a medicinal agent. I think Mr. Fuller has been confounding the effects on the system of alcohol as it exists in wine, and alcohol after it has been distilled from fermented liquor. Medical men and writers on diet represent the practice of adding distilled spirits to wine as very pernicious. They say that the alcohol thus added does not combine with, or is not acted on by the acids of the juice; and that the alcohol thus uncombined acts on the organs of the body in the same way as alcohol when diluted with an equivalent quantity of water.

This is manifest even in the difference of the moral effects of wine, in which the spirit is an integral element, and of those *colored liquids* called wine, which serve merely as the vehicle for a large portion of alcohol. The pure light wines of France and Germany produce an agreeable exhilaration of mind very unlike

the mere physical excitement, amounting almost to ferocity, which results from the largely brandied wines, which are too much in vogue in England. The disorders of the liver, which chiefly attend spirit drinkers, are also commonly met among those consumers of wine to which brandy or whisky has been adventitiously added, though such disorders rarely, if ever, follow even the intemperate use of pure wine. Much, therefore, of ill health, supposed to follow the habitual use of wine, must be attributed to the alcohol with which the wine is adulterated, not to the wine itself. Certain it is that intoxication is a very rare occurence among the inhabitants of the wine-producing countries. It has been held to be inexplicable why a quantity of alcohol forming an integral portion of some good sound wine will not affect the head to the extent or with the rapidity that half the quantity will do when taken pure, or still more rapidly when diluted with water. If the power which all vegetable acids possess of counteracting intoxication be called to mind, it seems natural that the free acids present in wine should hinder the spirit from acting prejudicially. Tartaric acid, that one most common in good wine, has the greatest power in this respect.—[Article Wine; Penny Encyclopedia.

I do not think that the alcohol formed in wine is so free from prejudicial effects as these writers state; but, if the difference in the effects between alcohol as it exists in wine, and alcohol as it exists after it has been distilled even from the same wine, be due, as I believe it is, to the free tartaric acid in the wine, then wine made from mature but unripe grapes, is less prejudicial as a beverage than wine made from perfectly ripened grapes; because in the unripe grape a greater amount of free tartaric acid exists than in the ripe grape.

I must defer until my next the further consideration of this most important constituent of wine, the acid, which is so valuable if it have the properties attributed to it of diminishing the intoxicating power of fermented liquor. From what has been stated, I think it must be apparent to every unprejudiced person that the use of sugar in wine making ought not to be considered an adulteration. On the contrary, sugar is the wine maker's most important agent; with it he can exercise a perfect control over the grape juice; he can, at will, make his wine sweet or dry; regulate within certain limits, the amount of alcohol; and give the wine such keeping qualities which are otherwise unattainable,

except in the most favorable climates, or in places where cellars of very low temperature are easy procured. Thus, from chemical and physiological reasons, it is incorrect to stigmatize wine as not pure because sugar has been added to it which has been grown in the organism of a plant other than the vine; and for the sake of scientific truth, as well as for the advancement of a domestic manufacture, it is desirable that the fact be generally known.

SORGHUM IN GERMANY.

The Secretary alluded to some German papers on the table, in which the subject of growing sorghum, in that country, was treated, which, he states, is quite successful.

REPORT UPON STRAWBERRIES.

Peter B. Mead, chairman of the committee upon strawberries, made the following report:

The committee understand their duty to consist in deciding which are the most valuable varieties for general cultivation. A strawberry for general cultivation should possess size, quality and productiveness, as well as adaptation to a variety of soils and location. In arriving at a decision the committee have necessarily confined themselves to varieties that have been somewhat widely grown and their value proved. No number of varieties have been prescribed to the committee, they have selected five, as follows: Hovey's Seedling, Longworth's Prolific, Wilson's Seedling, Jenny Lind, and Hooker's Seedling. The committee would remark, that some of the newer varieties will probably, in the course of another year, take their side by the best of the above, and, no doubt, supercede some of them; but they are not yet sufficiently known. Such varieties as the Bartlett, Boyden's Mammoth, Triomphe de Grand, Scarlet Magnate, and others at present less known, should, in the mean time, be fairly tested.

Of the seedlings exhibited, the committee made the best examination they could. From Dr. Habel there were two seedlings. No. 1 is a berry of large size and good flavor, and worthy of further trial, if productive. No. 2 is of large size, but acid and wanting in flavor.

From Mr. Clark, of New Haven, a seedling named Helen; a small berry, and not particularly noteworthy.

From Mr. Prince, a case of his seedlings, of which the Scarlet Magnate is the largest, and of good flavor; Perfumed Pine, the highest flavored, but small. In Mr. Prince's case was also the

Ladies' Pine, a small, but very high flavored berry. The committee ought to say, however, that they have seen some of Mr. Prince's seedlings in greater perfection than those exhibited on the present occasion.

From Mr. Carpenter, the Austin, a seedling raised by the Shaker's of Lebanon. The committee have had opportunities of examining this berry, from time to time, up to the 14th of this month, and on some subsequent occasions it was better than when first seen. The following is its description: Fruit large, roundish to conical, sometimes flat, occasionally necked, and uniformly with a large core; color light scarlet; seed brown, slightly imbedded; flesh white, rather soft and dry, acid and somewhat deficient in flavor; calyx large, many parted and persistent, stem stout and erect; flowers staminate. It is said to be very productive, but of this the committee have had no evidence before them, and therefore give no opinion. The above the committee believe to be a fair, impartial description of the Austin strawberry.

From Mr. Fuller a collection of upward of 100 seedlings, and a remarkable one for the large proportion of good kinds it contained. The seeds from which they were grown were collected from berries which had been carefully hybridized, and the result shows what may be accomplished when efforts are intelligently directed to this point. The committee have marked a large number of these seedlings as worthy of further trial, and given the numbers to Mr. Fuller. Two of these, 27 and 31, we recommend Mr. Fuller to keep for size alone; they are exceedingly large, but very sour, and we hope he will have the good sense never to offer them to the public. He deserves and receives our commendation for his well directed efforts in originating these new varieties of strawberries; and if any of them should fulfill their present good promise, we hope, in bringing them before the public, he will do nothing to impair the good opinion we have formed of him.

The Bartlett, a seedling which Mr. Fuller has grown for two or three years past is a fruit of very considerable merit It is of good size, and nearly as productive as the Wilson, but much superior to it in quality.

All of which is respectfully submitted.

PETER B. MEAD,
GEO. A. HITE,
L. A. ROBERTS,
P. G. BERGEN,
J. P. TRIMBLE.

July 16, 1860.

The varieties are given in the following order of value.

1. Hooker's Seedling. 2. Hovey's Seedling. 3. Longworth's Prolific. 4. Jenny Lind. 5. Wilson's Seedling.

Wm. S. Carpenter.—Contended that the Wilson seedling should take the first rank as a market berry over all others. He then read the following letter upon the cultivation of this variety.

I send you the following statement of the mode of culture and the yield of my strawberry bed:

The space of ground occupied by the plants is 126 square feet—less than one-tenth of an acre. The soil is sandy loam, with subsoil composed of clay and sand in nearly equal parts. In January, 1859, the ground was plowed to the depth of eight or ten inches, turning under a timothy sod three years old, and subsoiled ten or twelve inches deeper, so that every part of the soil and sub-soil was loosened to the depth of eighteen to twenty inches. In April, 1859, I plowed under a heavy dressing of stable manure, harrowed and raked the ground until it was well pulverized, removed all the grass, and, after giving a top dressing of twelve bushels of unleached ashes, set out Wilson's Albany seedling strawberry plants in rows three feet apart and one foot between the plants in the row. The bed had two hoeings before the runners commenced to grow, and afterward was kept free from weeds by the hand. This constitutes the great expense of cultivating strawberries upon an extensive scale, as it is essential to the production of large crops for successive years that the plants shall not be smothered nor the ground exhausted by the production of weeds. No protection was furnished to the bed during the winter. This spring the ground was almost entirely covered with plants and permitted to remain undisturbed with the exception of the necessary weeding. The bed blossomed early, and very freely. On May 27 the first quart of berries was picked, and the bed continued to yield until June 16. Every care has been taken to keep an accurate account of the quantity gathered, and the yield has been 880 quarts, making 9,050 quarts or 282 bushels to the acre. The number of berries growing and maturing upon single plants was frequently over 200, and in several instances 300 were counted upon a plant. The berries were large and fine-looking, those first sent to Wilmington selling for 25 cents a quart at a time when the common variety was bringing only 10 cents. Having other beds for my own consumption, all the berries from this bed were sold for

$116.14, from which deducting $21.93 for commission, freight, and picking, leaves $94.16 as the net return from less than one-tenth of one acre of ground. This variety possesses all the requisites of a market berry, being large, handsome, and very firm, meeting with a ready sale, and yielding, under equal circumstances, as great a number of bushels to the acre as can be obtained from the cultivation of the potato. I am confident that a greater yield can be obtained by cutting paths one foot in width between each row as originally planted, thus dividing the plantation into beds two feet in width, so that the vines can receive more air and light, and the berries be gathered without trampling upon the plants.

Mr. Fuller.—I believe the Wilson the most productive of all the varieties; but the Hovey I would not have, because we have so many others that are better.

Dr. Trimble.—Tastes differ so much that we cannot settle the strawberry question to suit all.

Mr. Pardee.—The pleasantest flavored strawberry grown is Burr's new Pine, and Swainstone's the richest, but these are not productive sorts.

Wm. S. Carpenter.—The Austin seedling is still in bearing, showing its value as a late ripening berry.

GRAPE PRUNING.

Mr. Carpenter moved that the subject of summer pruning of grape vines be one of the questions of discussion at the next meeting.

DRAIN PIPE.

A new drain pipe made of common cement and coarse sand, in a way to make it porous, is, as the exhibitor thinks, cheaper than tile of burnt clay. It is made of coarse sand and cement, only partially moistened, not enough to coat the grains, but simply hold them together when heavily pressed in the mold. Mr. Pierce, the inventor, states that a machine sufficient for making three sizes of drain tile can be furnished for $50, and that he can make four inch pipes for two cents a foot. This pipe is made without fire, and can be made by hand-power on any farm. If it possesses half the advantages attributed to it, it is of untold advantage to farmers.

CURCULIO.

Dr. Trimble.—I am now trying several experiments to prove that the same insect that stings the fruit makes the knots on the

limbs. No attachment to the bole of a tree can be any protection against a flying insect like the curculio. The excrescence on the limb is no more remarkable than the insect that produces the balls upon oak trees.

THE MEASURING WORM.

If any one desires to extirpate the worms that infest the trees in our parks, now is the time to do it by destroying the eggs. These worms may be kept from ascending by protecting the boles of the trees. If we had plenty of birds we should get rid of the worms. It is only in cities that these worms are so troublesome, where there are so few birds.

GRAPE DESTROYERS.

Dr. Trimble exhibited a specimen of a caterpillar that is trimming off the bunches of grapes. He thought, perhaps, that they will do no harm, only trimming off about as much of the fruit as the owner should do himself.

THE GARDEN OF AN ARTIST.

Solon Robinson.—Since our last meeting, I have visited the garden of an artist. Not an artist in gardening—not one who professes or pretends to practice horticulture upon a scientific or artistic plan. Nor do I mention it as a model of taste and skill which may be imitated by the wealthy, at great expense. I mention it rather as the garden of a mechanic, and just such a one as a great many mechanics or professional men might have, if they would; if they only knew how. I mention it full of hope that it may be the moving cause towards inducing other men who have daily employment, as this one has, at some trade or profession, to devote a little time, some money, and a great deal of sound common sense, in the cultivation of the little half-acre plats that we often see surrounding village residences, with examples of the utter uselessness of land except to enable the owner to show how barren and worthless he can make it. There is no need of this idle use of land. There is no reason why every owner of a village lot should not revel in all the luscious fruits of the season, and treat himself and his friends to an occasional bottle of wine, equal to any that he could purchase for a couple of dollars, just as George H. Hite of Morrisania is now able to do, free of expense; for his garden pays its own way, and a little more, of all cost of cultivation, leaving him in the enjoyment of its delicious fruits, fresh from the earth, or their pro-

ducts preserved to continue almost as fresh throughout the winter. And George H. Hite is not by profession, nor early education, a gardener. He is a native of a state less noted for its horticultural skill and productions, than for its productions of great corn crops, great bullocks, great men—physically and intellectually, and a great many candidates for the Presidency—one of which, a few months hence, is going to be elected. Mr. Hite is a Kentuckian, and some of his early years were spent in painting portraits in Louisiana. Then he came to New York, and during other years acquired fame as an artist upon ivory. Then, about nine years ago, like a sensible man, he began to create a home for his old age, when it comes—it is only in the blossom now; and that home I have visited, and I wish I could take every one who hears or reads of it with me to learn what an artist has done, and what a mechanic, a lawyer, a doctor, or anybody else might do in a garden upon a village lot. Will the sluggards who sigh after an abundance of fruit, and envy those who have, yet take no steps to have it themselves, believe me when I tell them that in this garden there are now growing grape vines of such extent, and such luxuriance and fruitfulness that, as a prudent provider, the owner must at once prepare several barrels to hold the juice of the surplus of the crop, after consuming all that he can fresh. I have never seen before so handsome and so fruitful an arbor as that which extends some fifty feet from the rear of Mr. Hite's house, and now affords such a delightful shady spot that, independent of the fruit, it is well worth its cost. I have never tasted such Isabella grape wine as that made by Mr. Hite, five years ago, with no addition whatever to the juice of the grapes. As to strawberries, the world is already aware that they grow to perfection in this garden, and Mr. Hite has told us how he makes them grow.

HOW TO GROW CURRANTS.

He also told us, last week, how to grow currants, and even showed us specimens of how they grow, but he did not convince any of us of what I am convinced now—that he is the most successful cultivator of currants in America, and can this day show the best results in the fruit upon his bushes. Not merely a few baskets full for family use, but bushel after bushel, red, white and black. The berries of the true red Dutch variety are upon the average as large as the cherry currants, under ordinary cul-

tivation; and as for productiveness, no statement of mine can convey an idea. To believe, you must see. And this is the result of pruning. True, Mr. Hite follows the scriptural injunction about a barren tree, to "dig about and dung it," with all of his trees, and vines, and shrubs, and flowers, and table vegetables, but with the currant, the secret of success is pruning. "Keep no old wood," is the injunction. Every branch that has borne three crops must be cut away at the ground, having been twice shortened in, by which the short fruit-spurs on the new wood are always loaded, and the bunches growing close to the canes, so that they look like ropes of red berries. To commence with a single plant, cut away close to the ground, to induce several vigorous shoots, instead of one, growing tree-shaped. Next spring shorten all these canes, and let the fruit grow below and new shoots above, and next spring shorten these again. Some of Mr. Hite's three-year old plants are now five or six feet high, so loaded with fruit that they have to be trained to stakes—which, by the by, is the true way to grow currants. Next spring these vigorous, fruitful branches, all that are three years old, will be unsparingly cut away. It is the secret of success. Meantime new shoots come up in successive order to take their place. I have no doubt of the fact that currant bushes thus treated, of the sour sort that are now growing neglected along many a garden wall, untrimmed in half a century, may be made to afford a field crop of more than two hundred bushels per acre, of superior size and flavor to those grown in the ordinary way, and that the cost of production will be far below twenty-five cents a bushel. The annual pruning would be the greatest part of the labor, and in the vicinity of this city the wood cut away would be worth nearly the cost of cutting, and in the country, where stone chimneys and brick ovens are still fashionable, the brush, when well seasoned, would make superior oven wood. Beside what I have said of this garden, there is much more to be learned from it, and that where it blossoms now, nine or ten years ago was a wilderness of wild bushes, blackberries, and rocks, and that he who has said, "presto, change," is not a magician, but a very humble individual, with no more power to produce such change than the most humble individual of the mighty multitude, who have an idea above the gutter, with a will to work that idea out in the rich productions of nature improved. Beside the fruitful grapes I have alluded to, Mr. Hite has what cost him, at Dr. Grant's

great nursery last spring, about $100, principally of the Delawares, now growing beautifully. But he is not satisfied with them, and I found him digging—don't be alarmed—he was not digging them up, but he was digging up a great, fruitful bed of strawberry plants, to make room for more Delaware grape vines, so satisfied is he that this will prove to be the greatest wine grape in America. I don't know but it will be a breach of confidence, but I hope to be forgiven for telling that Mr. Hite received last year for some of the surplus products of his little plot of ground, $400 in cash, which was more than enough to pay for hired labor and manure. I tell this to encourage others to go and do likewise. From Mr. Hite's well-earned reputation as an artist, I would have gone to him for my miniature portrait; but who would think of going to an artist to learn horticulture? Yet I have learned a good deal, and in my opinion every one here might learn in the same way something to their life-long advantage. Adjourned.

H. MEIGS, *Secretary.*

July 23, 1860.

Present, 50 members. Mr. Andrew S. Fuller, of Brooklyn, in the chair.

FROM THE CAPE OF GOOD HOPE.

The Secretary read a letter from the Rev. Mr. Adamson—who on a recent visit to the city of New York, was a constant visitor at the Club, and took a lively interest in its deliberations—detailing the effects of the oidion on the grape vine, demonstrating fully that this disease of the grape vine is not, as many have supposed, confined to the northern climate. Dr. A. mentions the receipt of a case of seeds and plants from Dr. Livingstone, the great African traveler in the interior of Africa. In return, a lot of American seeds have been transmitted to Dr. Livingstone, to be planted in the interior.

The following communication to a Capetown paper is from Dr. Adamson:

"Mr. W. Gibbons' interesting report on the botanical gardens was laid before Parliament last week. The following are the most important paragraphs of it:

"There are now in the garden many plants of timber and trees, pincipally coniferæ, raised from seeds received from India, Australia, and elsewhere. It is proposed to distribute these gratis

to the public gardens at Graham's town and Natal, as well as to private individuals throughout the Colony, who will engage to devote the necessary care and attention to their establishment and growth. From these trees, so distributed seeds may in future years be available in the districts where they are planted, for local distribution.

"A specimen of araucarias, just received from Australia, will be distributed in the same manner, free of charge.

"The communications and requests from the country for seeds and plants, and for information and advice on subjects connected therewith, have been numerous, and rather on the increase compared with previous years. All have been complied with as far as our circumstances admitted.

"Some progress has been made in labelling the plants with sightly and durable labels. Two hundred and fifty (250) have been done, and but for the difficulty of getting the labels cast in quantities, a greater number would have been done. The bulk of the plants in the collection should be named at once, leaving those doubtful and insignificant species for gradual accomplishment; to effect this, it is now proposed to request Messrs. Levicks and Sherman to procure from Europe two thousand (2,000) labels according to pattern; this number will be sufficient in the meantime to label all the most prominent plants in the garden.

"From Dr. Livingstone of the Zambesi expedition, a wardian case, containing plants and some seeds peculiar to the regions the Doctor is exploring, have been received, most of which are doing well. None of the seeds of what is presented as a valuable fiber (sample received) have, it is to be regretted, germinated. A distribution of the seeds and plants was requested by Dr. Livingstone. Seeds of the finer yielding plants have been sent to India, Kew, Australia, Natal and Graham's Town. Specimens of the plants have been sent to Australia and Natal, and a further distribution will be made to England and India. A collection of seeds of economical plants has been forwarded to Dr. Livingstone during the year.

"From the financial statements annexed, it appears that the receipts of the institution during 1859, were, in the whole, £849 9s 4d; the expenditure, £677 5s 10d; leaving a balance at the Cape of Good Hope Bank, on the 31st of December, of £172 3s 6d.

"The estimated expenditure for 1860, is £926, which will be

swallowed up by the proposed expenditure, leaving, it is supposed, a deficiency of £53 13s 6d. During the ensuing year, £200 will be appropriated for the improvement of the new ground at the upper end of the garden."

THE CONSTANCE STRAWBERRY.

William S. Carpenter mentioned a new strawberry from Boston, of the above name, which he thought would prove an acquisition to our gardens. It is of French origin. He also mentioned the Triomphe de Gand, as an exemption to the general condemnation of strawberries, that is coming into favor generally.

REMEDY FOR THE PEACH GRUB.

KINGSTON, LUZERNE CO., PA., *July* 9, 1860.

DEAR SIR: I observed in the transactions of the club of July 2, it is thought that if a discussion of the topic of the peach grub would elicit a remedy it would be universally entertaining. My conclusion is that the cure of the peach grub, unless where the soil is light and but few are found, is a humbug. I have a preventive which I will give cheerfully:

When I purchased my little place on Ross Hill, overlooking a portion of "Wyoming Valley," there were one hundred neglected peach trees thereon—budded and of excellent varieties—which were full of grubs. Early in April I commenced operations by carefully clearing away the grubs by means of the knife and wire. I then made a funnel shaped hole around the base of each tree, which would hold three or four quarts of water. I filled the holes with boiling water, which effectually destroyed the progeny. I then filled the holes with a tenacious clay and stamped it hard, leaving the surface around the tree cone-shaped and stamped hard. I have examined these trees at various times during the intervening five years, and have found but one tree affected, and that with but two grubs. This mode, with me, has acted as a perfect preventive, and I have no doubt will with all who adopt it and exercise the same care.

These trees were three or four years old, and at the time the experiment was made much inferior to some from the same lot growing elsewhere which were regularly examined and carefully cleared of grubs in the usual way. My trees are sound in wood and look well, while the other have disappeared.

In planting peach trees now I would cut away the tap (not top) root close under where the horizontal roots put out, having driven a stake firmly for each tree and plant so shallow that after the few first rains the upper side of the roots will become exposed. In this way the trees are not so liable to become infested with the grub. I planted some so a year ago, and find the non-appearance of the grub satisfactory.

If these hints may prove of interest to the club and benefit to any cultivator, I shall feel gratified.

Very respectfully,

P. M. GOODWIN.

R. G. Pardee.—I have tried the hot water very often, and have always found it effectual; and I thought that by this time everybody had heard of it, but if they have not, I hope this letter will be read and remembered. Instead of clay I used leached ashes, as they were the most convenient, and they answered a good purpose.

FIGS RIPENED IN BROOKLYN.

Mr. Prescott exhibited a specimen of his figs grown in Brooklyn to perfection. He has grown them in a sheltered location for several years. He secures the trees in the fall with straw and loose manure.

The chairman said more attention should be paid to fig growing in this vicinity. There is but little more difficulty in growing figs here than there is raspberries.

CURRANT WINE.

Solon Robinson read the following letter of inquiry, and elicited the following facts:

Sir: Will you please have the goodness to inform me, by return mail, how much sugar to add to one quart clear currant juice to make wine of? You will very much oblige many by sending a recipe.

In reply Mr. R. Stated that the common practice was to add as much water as there is juice, and three pounds of double refined sugar to each gallon, or rather the better way to put three times as many pounds of sugar in the cask as it holds gallons, and then put in half that number of gallons of pure currant juice, and after shaking the cask thoroughly fill it up with water and let it ferment, keeping it carefully filled up until the fermentation is over, and then cork tight and let it stand entirely un-

moved for at least one year, and then draw off to bottle with a syphon.

A gentleman said his wine was always best when standing two years before bottling.

The chairman said that water never should be added to grape juice. If you desire your wine high colored and a little astringent, let the mashed currants stand some hours before straining. If you wished it light colored, strain immediately. Put ninety pounds of sugar in a thirty-gallon cask, and fill it with pure juice, without water, if you want good, strong, and sweet wine. It can be made good with less sugar. George Hite has got some that has stood in casks six years.

SUMMER PRUNING THE GRAPE-VINE.

On motion of John G. Bergen, this one of the questions of the day was taken up, and the chairman requested to give his views. His statement was in substance as follows:

Andrew S. Fuller.—Summer pruning of the grape is one of the most important operations belonging to the vineyard. In all modes of training, this operation is necessary for directing the vital principle and proper maturation of the plant. It is not only an economical operation, saving much labor that would be otherwise lost, if the vines were left until the annual pruning, but by concentrating the sap into that particular portion of the vine where it is needed, we are able to produce a much larger quantity of superior fruit than we otherwise should.

By summer pruning, we do not mean the cutting off of large branches, but by a system of pinching, or stopping the young shoots with the finger and thumb, and this is called summer pruning. When a vine is planted, we should never allow but one shoot to grow upon it the first season, and never allow any side shoots or lateral to grow any length out from this, for if we do, the bud at the axil of the leaf where this lateral springs, (which is the embryo fruit-branch for the coming season,) will be very much injured, if not entirely destroyed; besides, the sap will be distributed through many small branches, instead of being concentrated into one strong shoot.

The operation of pinching off the laterals is generally performed thus: When they have pushed out and formed one or two leaves, then the end is pinched off, leaving one leaf; when they have pushed again, pinch again, and leave another leaf, and so

on as long as the vine continues to grow. This keeps them in check, and by leaving occasionally a leaf, it does not deprive the vine of so many leaves as it would if the laterals were broken off close to the main stem, as is sometimes done, and we may say safely done at the beginning of the season—but at midsummer and later in the season there is dnnger of forcing out the next season's fruit bud, which is at the base of the lateral, and when this is done, of course you lose your next season crop. This summer pinching has always been an operation that was strictly attended to in all well regulated vineyards in all ages.

It was called, in olden times, pampinating—taken from the word pampinus, a young shoot. In later days, weeding the vines. Columella says that we should suspend the operation while the vines were in flower, for fear of destroying the embryo fruit—an idea worth remembering. The main shoot may be stopped when it arrives at the proper height, and then let the uppermost buds push out and grow for a while, and then check these. By doing so we can often make our vines much stronger in growth than they would otherwise be if this was not done, beside ripening their wood thoroughly. If we allow all the laterals or side branches to grow on a vine, and by doing so divide and subdivide the nutriment which it receives through its roots, we shall then have many small and weak branches, none of which will be strong enough to fully develop or mature their fruit.

In our northern latitude we have always observed that when vines were allowed to grow in this way, these small shoots were never well ripened when the cold weather came, and the consequences were, we had immature wood and immature roots, both of which were destroyed by the cold weather. For it is indisputable that unless a vine is made to mature all its branches by the time cold weather comes, a corresponding number of its roots will also be unripe. To this cause alone a great proportion of the failures in the vine culture in this vicinity can be attributed. Further, when we come to the annual pruning, if we have one hundred branches to cut off, we make one hundred wounds, each one of which will take a certain amount of alburnum to heal over, and thereby causing a vast amount of the strength of the vine to be directed to this purpose, which might have been used in furnishing food for new wood and fruit, had there not been more than one-tenth of that number of wounds, which is all that

would have been necessary if the vine had been properly summer pruned.

No definite rule can be given that will be applicable in every case; for some vines will grow strong, and others weak; some disposed to throw out many branches, others few; besides, each different mode of training will require summer pruning consistent with the plan adopted.

In some modes of training it is found quite beneficial to pinch off the end of the fruit-bearing branch three or four leaves beyond the last bunch formed; in other modes it would be very injudicious. But in pruning as well as in all other operations in the vineyard, the operator must fully understand what he wishes to accomplish, knowing that certain causes will produce certain results. Those who believe that nature is the best teacher, and therefore leave their vines to ramble without check or restraint, would do well to remember that our cultivated fruits are no longer wild plants, but have, in a great measure, changed their natures, and have become somewhat artificial and no longer in their normal state.

If we would look upon the various phenomena connected with fruit culture, in this light, we should often be better pleased with the results of our investigations, and more clearly comprehend the causes of our many failures.

John G. Bergen.—I have taken off all the laterals of a vine without starting a single one of next year's fruit buds, as has been mentioned there is danger of.

Wm. S. Carpenter.—I trimmed a Diana last year by pinching out the buds of all the laterals, and have this year a fine crop of grapes. In pinching out the laterals, care must be taken not to pinch the fruit buds.

Dr. Underhill.—It depends upon the richness of the soil about summer pruning. If the soil is very rich, there is danger of the first buds starting as soon as the laterals are pinched in. If the laterals and leaders are both pinched off, the tendency will be, in a strong, growing vine, to send out the fruit bud forming for next year, so as to have the new grapes in autumn and no crop next year. The Isabella will not bear the forcing cultivation given to hot-house vines. In moderately fertile soil, the Isabella will bear pinching in pretty closely, but not upon highly fertilized vineyards. I do not, of late, stop the growth of my Isabellas. My Isabella grapes are much better, as a general thing, than

those grown in Ohio. I think the practice of summer pruning inapplicable to the Isabella variety, and all other strong growing plants. The French or German mode of cultivation does not answer well in this country.

The Catawba grows its wood more firmly, and admits the German cultivation better than the Isabella. No grape but one of slow growth will bear to be cultivated entirely on the renewal system. I would put new plants into generous soil, and give them all the growth I could to ripen the wood thoroughly. Still it is not best at any time to drive the growth of a vine too fast. A rapid growing vine, or a vineyard forced by high manuring, will not make as good wine as one of slower growth. The Delaware and Rebecca, and some others, are of slow growth. Bones and compost of muck and yard manure are the best fertilizers. I never use guano, nor any very heating manures, such as that from the hen-house or pig-pen.

John G. Bergen asked, what is the advantage of taking off laterals of a very rapid-growing vine? The doctor answered: to give the fruit more sun and air. I used to do it, but do not of late. Probably a stronger growth is gained in the leader by pinching off the laterals. There is no difficulty in getting a good growth of wood with the Isabella and Catawba.

The Chairman.—At Cincinnati, the horizontal system is found to be better than the low system.

Dr. Underhill.—The low system is only good for slow-growing vines.

Mr. Carpenter said—One of the finest looking arbors that I have seen lately, both of Isabella and Catawba, the vines had been subjected to the most severe summer pruning that I ever saw. They were growing in a very rich border at Harlem.

Mr. Pardee.—It is a very common thing for the vine pruners of this city to cut away all the wood beyond the two branches of fruit left upon the cane.

The Chairman inquired for information about the Lenoir grape, which he stated was very hardy, north of this city, and likely to prove a very valuable variety. The fruit is very sweet, the bunches of fair size, and the berries small; the leaf and wood resemble the Herbemont. Adjourned.

HENRY MEIGS, *Secretary.*

July 30, 1860.

Present, 50 members. Mr. G. H. Hite in the chair.

CORN.

The question of corn cultivation was called up and discussed at some length and continued.

Solon Robinson read the following extract of a letter, and made the annexed remarks: John H. Hilton, of Batavia, Jefferson county, Iowa, writes as follows about corn cultivation:

"Can some of your scientific farmers give me some information on plowing corn when it is earing? Some farmers here plow their corn always when it is earing, and others again cultivate it well till it tassels out, and let it rest. I cannot see how cultivation will benefit corn when the roots collect in such quantities as to choke the plow. Could not the American Institute Farmers' Club discuss the matter? I want more light.

To this I answer, "and so does the whole country." It wants more light upon the question of cultivating Indian corn; for notwithstanding it has been cultivated ever since the Pilgrims landed at Jamestown and Plymouth, their sons are still in the dark about the best way how to do it. The old Indian mode of hilling up the loose earth around the stalks, was a mere thing of circumstances by which they were surrounded, and like a great many other men before them our sires and their sons became imitators. They never stopped to inquire or think why it was done. Now my correspondent is not disposed to travel in the dark because others do. He wants to know if growing corn can be benefited by plowing among the stalks after they have grown so large that their roots fill the soil and the ears are setting. Who can tell? Those who practice that way will say it does. I say, does any one know, by careful experiment, whether it will or not? My opinion is that the corn ground should be prepared by very deep working before the corn is planted, and it may be once after it is up, but not afterward. I am in favor of using the sub-soil plow upon all corn land. It is the best tool ever used for marking the rows, though I have seen a good substitute used in Virginia, in the form of an ordinary coulter, with the point a little turned up, which was run sixteen inches deep on the bottom lands of James river, simply to mark the rows. The seed planted over this crack has a tendency to send its roots straight downward, where after cultivation will not reach them.

There is no better implement for the first time between rows than the subsoil plow, once, twice or three times, according to circumstances. If the corn was planted by a subsoiler mark, once between the rows will do. If it was planted upon a mere surface mark, it will pay to run the subsoiler close to each side of a row, once in the middle. After that, use Knox's horse hoe, or some other scarifying implement, as often as you please, particularly in case of a drouth, until the corn is large enough to overshadow weeds, and then let it rest.

I never would hill corn, nor anything else. My motto is level culture, and such preparation of corn ground as to fit it so as to require but little after cultivation.

Wm. S. Carpenter.—The subsoil plow is one of the best of all implements in the cornfield, as I have proved to my entire satisfaction. I also advocate local culture. I harvest my corn by cutting it up as soon as the kernels are glazed. It is set up in shocks where it grows, and it never should be hauled off and set upon sod ground to cure, as I have known some crops spoiled by thus transferring the shocks.

The Chairman said that the butts of the stalks set on the soft earth served to keep them green, and so perfect the grain.

Mr. Fuller inquired if any one had suffered from drouth this year upon land that had been worked two feet deep. He stated that he set cauliflowers upon land that was poor and gravelly, which was dug two feet and they did very well.

WHAT IS A GOOD CROP OF OATS?

Solon Robinson.—I ask what is considered a good crop of oats, partly for information and partly to impart some, about growing oats. I have never, until this year, grown any in this part of the world, and perhaps I don't know how. When I was a boy in Connecticut, I used to help split the corn hills in the spring, and upon that three pecks of oats being sown, the ground was sometimes harrowed and sometimes very slightly plowed, and the oats grew, but not very large, I think. But I don't remember what was considered a good crop. I don't think that was a good way to grow oats, though I have seen it practiced in later years. Now I will tell how I practiced, and the result, and let others judge which is best, their practice or mine. I thought this last spring that I should want a little piece of oats for soiling, and directed my English farmer where to put them in, partly upon a very hard worked piece of gravelly land, where I tried to grow corn last

year, and did, by manuring high, say 600 pounds per acre of Mape's superphosphate, and partly upon land that I cleared last year of briars, bushes, tussocks, &c., it being the dryest part of that piece of bottom land where I planted my cranberry plat. The very tough sod was as well plowed last fall as I could get an Irishman to do it by the job. The way it was treated in the spring was first to put a subsoil plow into it by means of a yoke of good strong oxen, upon the corn stubble part that worked well, and only so-so in the sod ground. By the by the corn stubble had been plowed in the fall after the corn was harvested. This new way of plowing attracted some attention. Several passers-by stopped to look and wonder, and say "pooh." After it was thus plowed, it was dressed with a moderate coat of manure, composed of barn-yard, well rotted stuff, and hair and spent lime, &c., from a glue manufactory, and old ditch bank stuff, to which was added a small percentage of the bulk of printer's roller composition, and about a peck of salt to a cord of manure. It was piled in the fall, and overhauled once in the winter, and was not quite ripe when a portion of it was spread upon the wet ground. After harrowing over the manure, to break the lumps and mix it with the soil, three bushels of common black seed oats were sown, and plowed in with a light plow, and again harrowed. This was done about the 12th of April, and the season that followed was not favorable to the growth of a good crop. It was altogether too dry for the growing plants to get the full benefit of the manure; but they grew, and I soon began to hear that Robinson had the best piece of oats in the county. I wished every day that the piece had been large as well as the oats. My neighbors were sadly disappointed, I believe, that the crop did not all fall down before it was ripe, but it did not—only part of it, and that part on the new ground, which is say two-fifths of the whole. The great drouth in July prevented the plants from attaining as large a growth as they would, particularly on the old ground, which is part of a piece noted for its poverty. I show a fair average sample of the growth upon the corn ground. The straw you see is about four feet and a half long. Some of it on the new ground was full a foot higher. It was as high as my shoulders, and stout in proportion. Intending to feed the crop without threshing, I had it cut pretty green— that is, as soon as most of the straw turned yellow. That on the corn stubble part and a portion of the other, was bound up into very stout double

banded sheaves, which were, when well seasoned, quite as heavy as I cared to pitch, upon that pretty warm day, July 20th. Of these sheaves we had thirty-one dozen, and the heads were well loaded with plump grain. The other part was mowed and cured like hay, and pitched up into cocks, so that we could estimate it as though in sheaves, which we did at full twenty dozen. I think it was more, as it made two snug ox-cart loads, and more than two-thirds the bulk and apparent weight of the other part. Then there was beside, a little load of rakings. I will call the whole fifty-two dozen stout double-banded sheaves, which, if threshed, would surely yield a bushel to the dozen.

Now, was that a good crop for such land as the average of the badly-worm farms of Westchester county, upon a piece of ground of the following dimensions? The first side is 156 feet; the one opposite to it, 183 feet; the two other sides, one is 168 feet and the opposite 213 feet. The superficial contents if I calculate right, are 32,290 feet. The superficial contents of an acre are 43,560 feet. Three-fourths of an acre, then, contains 32,670 feet, so that my patch of oats lacks 380 superficial feet of surface of being three-quarters of an acre; and what I want to know about it is, whether farmers hereabouts will consider it a pretty good crop? And if it is, I want to know whether it is not worth their while to think about manuring oat ground? And also think about plowing oat ground with a good-sized subsoil plow? And what do they think about plowing in the seed? And finally, what about sowing four bushels of seed per acre, and harvesting sixteen fold? It is a matter which will do to think about.

Mr. Carpenter.—I have threshed oats, no better than the piece mentioned by Mr. Robinson, which I saw while growing, and, they produced a bushel to ten sheaves; this would give him 62 bushels—say 80 bushels per acre. I have no doubt that the same result may be produced in the same way upon large fields.

Adjourned.

H. MEIGS, *Secretary.*

August 6, 1860.

Present—56 members.

Mr. Adrian Bergen, of Long Island, in the chair.

COMMERCE IN HAMBURG.

Judge Meigs, the Secretary, commenced the business of the day by calling attention to a new work just issued in Hamburg,

giving the statistics of commerce in that old city. Some of the facts adduced by the Secretary were very interesting, but too lengthy for our colums.

MINERALS AND VEGETABLES.

The Secretary read the following paper upon the food of plants, and their mineral constituents:

"Plants use every mineral to some extent. Iron, the most useful to us all, is most largely used. All the metals are used cobalt, tin, lead, silver, copper, gold. All the earths and crystals—every poison—are taken up by them, and thus supplied to the animals who eat them. Chemistry has no means of measuring the homeopathic doses in them for the most part; but gold has been found in the violet in the form of purple of Cassius. Gold and silver can be found in the durable petals of some of the chrysanthemums, and on the skins of many fruits, if not in the flesh. Water is the grand solvent—bearing in it all the components of our earth, aided by every acid in millionth or billionth proportions, and so feeds our plants. Iron seems to be more abundantly used by plants than all others, and is for man the most wholesome.

MINERAL INSECTS.

Insects are gloriously dressed in all the splendors of the metals. Solomon had studied them and wrote a book on them, which is lost. He said that Kings, in all their glory, were not so well dressed! Gold, silver, cobalt, cinnabar, iron, copper, and all others, for their coats of mail! Diamond forms their eyes! They see farther than the animals, and many objects at once. Some see through 1,000 diamonds at once, so as to command a view of every enemy or of every flower and fruit. Their flight exceeds our knowledge. A house fly often makes sixty miles an hour, and can sustain it for a long time. The libellula, at a speed of forty miles an hour, can stop and turn in less than six inches. The bee sees several miles off his objects—his velocity cannot be less than forty miles an hour, and no mathematician can make a right line on paper equal to his right line in the air called a bee-line. Man never attained his dress, his eye-sight, nor his movements. These insects, if made as large as men, would in one hour be masters of the world.

ARTERIAL DRAINAGE.

In Ireland, extraordinary success has attended the operation of the general act of Parliament by the board of public works. Ten years have passed, and 7,000,000 acres have been chiefly cleared of the water, and rendered sub-drainage possible, at a cost of about $21 per acre. Eleven thousand square miles have been thus cleared of the water of ages and brought into cultivation, much of it highly profitable.

COMPOSITION OF TURNIPS AT DIFFERENT PERIODS OF GROWTH.

By Prof. Anderson, chemist to the society. Fourth period. Water, albuminous compounds, other organic matters, ash and nitrogen, peroxide of iron, lime, magnesia, potash, soda, chloride of sodium, phosphoric acid, sulphuric acid, carbonic acid, silicic acid. Rationale by the learned Professor. Supply the soil with all the turnip wants.

Let farmers consider this subject, and apply the remedy to any soil that lacks the constituents of a good crop of turnips.

THE MOWING MACHINE.

From *The London Farmers' Magazine*, the secretary read some accounts of the American mowing machines. One man and a boy and a pair of horses can cut fifteen acres a day with ease, and the machines are fast gaining in favor.

RAIN WATER.

It is stated that 511 tuns of water to an acre fell in June in some parts of England.

ROOM FOR PLANTS.

All plants should have an abundance of room, both in roots and branches. There is as much need of room for food from air, as food by the roots.

A FROZEN SOIL,

That is susceptible of some cultivation and production of food plants, exists at Behring's Straits, that never thaws more than seven inches deep, as appears by a statement read by the secretary from the Russian Imperial journal of agriculture.

WINE FROM UNRIPE FRUIT.

The secretary made a statement from a correspondent at New Harmony, Ind., that unripe fruit makes better wine than that fully ripe. Of course the writer adds a large portion of sugar. A gentleman present stated also that a friend of his, in making wine from grapes, never separates the green ones.

HOLLYHOCKS.

Mr. Robinson.—I call the attention of the club to this beautiful basket of flowers, which I now hold in my hand. They are merely a few samples of that very much neglected flower, the holly hock.. You see how much the original sorts have been improved. Here we have flowers as large and full as the very finest dahlias, and more easily cultivated. These were mostly grown from seed planted when I took possession of my eight-acre farm in the spring of 1859. This very beautiful yellow one came from that prince of flower distributors, B. K. Bliss of Springfield, Mass. I have called your attention at this time to this lovely kind of flowers, that you may commence at once to save seeds of all the fihe varieties that you happen to see in bloom. One of the best situations to plant hollyhocks is by the border of flowering shrubbery, such as blooms early, and would now appear to one at a little distance to be loaded anew with flowers. All around the house, and in the yards, garden, lawns, there are plenty of waste spots which might be highly beautified if planted with a few seeds, that in time produce such magnificent flowers as these that I now exhibit to you, and which I hope some of the ladies present will take home with them as tokens of remembrance to try and produce others, and still finer ones.

Wm. S. Carpenter.—The hollyhock is cultivated to great perfection in England, and I am very glad to have the subject called up, and I hope it will have a tendency to increase their cultivation in this country.

R. G. Pardee.—I saw lately a hundred varieties of this most beautiful and easily cultivated ornament of the country cottage, or even the town residence. Now is the time to think of saving seeds, and now is a good time to plant them, and then they will flower next summer. I join with others in urging the increased cultivation of hollyhocks. They are very hardy, requiring little or no protection in winter, and are certainly highly ornamental.

PARASITES OF CATERPILLARS.

Dr. Trimble introduced specimens of the caterpillar that preys upon the grapevine, to show that it has its parasite, one of which had just emerged from the body of the caterpillar. This he hoped would prove a sufficient check to the ravages of this particular pest.

THE CURCULIO.

Dr. Trimble also showed specimens of the curculio of plums, that he had hatched out in earth covered to prevent escape, to show that the insect becomes perfect from the first laying of eggs in young plums, and, as he thinks, these perfect insects lie dormant till spring. The question is, where do they hide themselves until the young fruit is ready for them to deposit their eggs.

WASHING INSECTS FROM FRUIT TREES.

Mr. Pardee read a letter from Chas. Lincoln of North Bridgewater, Mass., which stated that he succeeded in saving his plum trees last spring from insects, by washing them frequently with clear cold water, using for the purpose a little hand instrument called the "hydropult."

ROT OF PLUMS.

Dr. Trimble contended that all the rot in plums is caused by the sting of the curculio.

Mr. Pardee thought that this statement was incorrect; that plums frequently rot where there are no curculio. He said, thirty years ago, at Seneca Falls, there was no curculio to disturb the plum, and we grew great crops, and sometimes nearly all on a tree rotted, almost all at once.

A NEW CEREAL.

Wm. S. Carpenter read a letter and showed a sample of a new wild grain, from Washington Territory, which the writer thinks may be an acquisition as a substitute for oats, as it appears to be a hardy plant and productive of a small grain, something like rye grass.

John G. Bergen.—We have a wild plant here somewhat like this, but we do not appreciate it as of any value for grain or hay.

SAMPLES OF FRUIT.

Wm. S. Carpenter made a very handsome exhibition of nine varieties of apples and five of pears, now in season, all except

one being from trees which, said Mr. Carpenter, I have planted within ten years. The yellow Harvest apple was over ten inches in circumference.

The Beurre Giffard pear is one of the best early pears we have. The Diana d'Ete is an earlier pear, and by some preferred.

The Red Astracan apple is one of the very best early varieties. The Strawberry apple is also a very choice one, and the most fragrant of all.

The Belle de Fontenoy raspberry is the largest, and is quite hardy and produces a good fall crop, as well as spring or summer crop. It grows upright, about four feet high.

The Cattawissa is another very valuable variety of hardy raspberries. The only way to propagate this sort is to bend down the canes and cover the tops. This also produces a good fall crop.

The Allen raspberry I consider nearly a worthless sort. It is a pistilate variety, and will not do anything without being mixed with some other sort, and with me, while I can get so many other better sorts, is not worth attempting to cultivate.

Some other gentlemen expressed themselves to the same effect in regard to each of these varieties of raspberries.

WINES.

The subject of wines being one of the questions of the day, was now called up, and George H. Hite of Morrisania, was called upon to give his explanation of his method of making domestic wines, samples of which were given.

ISABELLA GRAPE WINE.

This sample, made in 1856, of pure juice of grapes, without sugar, was highly approved—in fact it was considered the best Isabella grape wine ever tasted by the testing committee, which consisted of John G. Bergen, R. G. Pardee, and Judge Meigs.

ELDERBERRY WINE.

This was not considered very good after tasting the grape wine, though it was much like a strong claret, and gave satisfaction to some tasters.

CURRANT WINE.

This was considered an excellent wine—that from black currants was much like port wine—more medicinal than as a beverage. Some from red and white currants was thought to be equal

to almost any of the most esteemed sorts of grape wine in common use.

At the next meeting of the club, the committee will give a report of their opinion of the several samples of wine, and Mr. Hite will give his exact method of manufacturing it, and the process is so easy that it can be followed by any intelligent family, and an abundance of wine produced, not only for the maker's own use, but, as in the present case, sufficient to make the crop a very paying one.

Beside the opinion of the committee appointed to test it, that of all the members present who desired to do so was taken from tasting the several samples, after the club adjourned, and their commendation of the grape wine of 1856, and some of the wine from red and white currants was given in very strong terms. In fact, we consider Mr. Hite's success has established one great fact: that to make good wine we must use no water beyond what is barely necessary in the work, and only just sugar enough to bring the juice up to the standard weight of nine and a half pounds to the gallon.

THE CANKER WORM.

Mr. Carpenter stated that the canker-worm in the northern part of Connecticut is now ravaging the orchards to an extent that is destructive to all prospects of fruit. On some large orchards there are no apples—in fact, nearly all the foliage of the trees has been destroyed.

Dr. Trimble, in answer to the question, what remedy to apply to this pest, said that the only remedy is the ichneumon parasites. These in their proper time will attack the worms and destroy them. In the mean time, while one section of the country is ravaged, another is extraordinarily fruitful.

Subject for the next meeting—fruit continued, "corn and potatoes." Adjourned.

HENRY MEIGS, *Secretary.*

August 13, 1860.

Present, 69 members. Wm. Lawton, of New Rochelle, in the chair.

Judge Meigs, the Secretary, opened the proceedings by reading some interesting translations from French and Russian horticultural journals, one of which treats of a new food plant from

China, which we should judge to be something between a cabbge and a turnip.

ANALYSIS OF WINE.

Judge Meigs also introduced an extended analysis of wines which will be printed in the Transactions.

THE YIELD OF STRAWBERRIES—ERROR CORRECTED..

Solon Robinson—I have a letter from C. A. Cowgill, of Dover, Del., correcting his error about the quantity of land which he had in strawberries, which has been so much commented upon, and which has all arisen from inattention to punctuation, and it is on that account worthy of most particular attention—for the same thing is such a common fault with all letter writers. Mr. Cowgill says:

"I have been somewhat annoyed at the inability exhibited by yourself and correspondents as reported in the proceedings of the Farmers' Club of New Yord, to comprehend the very plain statement I make in relation to the yields of my strawberry bed.

"I suppose you did not take the trouble to read the statement, but only listened to it. I said the plot was 126 square feet less than one-tenth of an acre. This cannot admit of more than one construction, viz: That if the bed had contained 126 square feet more than it does contain, there would be one-tenth of an acre in it.

"Suppose you were to ask a person how much ground is contained in such a lot, and his answer were to be: There is 100 square feet less than an acre, would you not clearly comprehend him? Or would you imagine that he said there were 100 square feet in the lot, and also conveyed the very original information that 100 square feet is less than an acre? Yet such is the construction you appear to have placed upon my statement."

Now let us see what Mr. Cowgill did say. Here it is, as it was printed, and just as he wrote it:

"I send you the following statement of the mode of culture, and the yield of my strawberry bed. The space of ground occupied by the plants is 126 square feet—less than one-tenth of an acre."

The error is all his, not ours, and no other construction could be placed upon the statement than just what has been placed upon it. The fault is in the construction of the sentence. It is a very common fault. Mr. C. is not a fool, as he says in a part

of his letter, our comments make him appear; but he is careless in his punctuation. The difficulty about making himself understood comes out of that dash after "126 square feet—" and a want of a comma after plants.

Now, let us reconstruct this sentence for the benefit of all future writers, as well as those who misunderstood the first statement:

"The space of ground occupied by the plants, is just 126 superficial feet less than one-tenth of an acre."

This is plain. The other is not.

Wm. S. Carpenter read a letter from Mr. C. to the same effect. The bed was 128 feet by 33 feet, which Mr. C. finds 132 feet less than one-tenth of an acre. The cash results were $116.14. Mr. C. thinks that he can grow 400 bushels of Wilson's seedlings per acre on land thoroughly prepared by trenching.

THE FEEJEE TOMATO.

Mr. Carpenter showed specimens of this tomato, which is one of the most solid and meaty of all the varieties; and exactly like the kind of which seeds were sold last spring at high prices under the name of "the perfected tomato." It was a cheat, so far as the name is concerned, and so far as it was represented to be an entirely new sort.

A NEW SEEDLING GRAPE

Was introduced by Mr. Reynolds, of New Jersey, now nearly ripe. It is very sweet, small size, but has a thick skin.

CICADA—THE LOCUST.

Dr. Trimble—I found yesterday the eggs of the locust are beginning to hatch, and the young insect is as perfect in shape as the old ones, of a perfect white color, and no larger than one of the eggs.

THE POTATO ROT.

The Secretary asked the question whether any members of the Club had observed the potato rot disease anywhere this season?

Only one person reported having seen any symptoms, and that slight upon the Prince Albert sort.

Mr. Carpenter said that he had lately traveled in several counties near here in this State, Connecticut and New Jersey, and had not seen or heard of the disease anywhere, although he had inquired of a great many persons. Mr. Carpenter advocates early harvesting of potatoes, before the vines are entirely dead.

A LONG ISLAND CROP OF POTATOES.

John G. Bergen made the following report of a crop of pota toes grown this year upon his farm on the bay shore of Long Island. It is worthy of especial notice for its exactness and reliability. Mr. Bergen stated that this report shows the general practice and results of potato growing on Long Island:.

Statement of result of planting seven acres of potatoes—expense—mode of cultivation—crop—marketing and proceeds, gross and net.

Location, Eighth ward, Brooklyn. Soil sandy, sandy loam, loam, clay loam, clay and gravel, with all shades of admixture. Land all manured before plowing with a broadcast application of either New York city street manure or seaweed gathered from the shores of New York bay, blown or drifted on the beach by force of tides and winds. Variety planted, Dikeman, except three-quarters of an acre Mercers. The plowing and planting all done between the 9th and 26th of March, the planting between the 15th and 26th of March inclusive. Depth of plowing eight inches, except one-quarter of an acre subsoiled to the depth of sixteen inches. The crop dug and sold between the 2d of July and the 1st of August, 1860. Vines exceedingly green, and potatoes about half grown when digging commenced, and, with the exception of about a half acre of the last dug, the vines continued green. Crop 1590 bushels prime potatoes, 85 bushels culls, and 26 bushels small hog potatoes; total 1701 bushels. The crop would probably have been increased 25 or 33 per cent., if all the potatoes had fully matured before harvesting. The yield was 243 bushels to the acre. Amount sold $1190, or $170 per acre. The ground since all planted with second crops.

The potatoes before planting were all cut from two to six pieces, depending upon size, and were planted in drills—the drills three feet apart, and from three to four inches deep—the sets were placed about fifteen inches apart.

Well rotted horse and hog manure was placed in the drills and the seed placed on the manure. The potatoes and manure were covered with a small one-horse plow, running it on both sides of the drill, throwing up the ground in the form of a ridge over the drill. When the sprouts were within two inches of the surface, the ground was dragged nearly level, with a light wooden-tooth harrow. As soon as up, the potatoes received a light dressing with the hoe without hilling, having previously been plowed from

the hill with a small cut mold-board plow, run twice through the row. When about six or eight inches high, the plowing was repeated reversing, by throwing to the hill. This was followed by another light hoeing, without attempting to raise up the ground to the vines, the plowing, however, having the effect to hill up to some degree. A few days later, before the vines closed up the rows entirely, a small cultivator was drawn once through every row. This process left the land almost entirely free of weeds, &c., at the time of digging. The digging was all done with the potato fork. All of the ground was cropped the previous year, most of it being sod or grass land. The potatoes when dug were at once picked up in baskets, and sent to Washington market.

Some abatement may be made in the number of bushels, as the cultivation is based on three bushels to the barrel, which is short of the true measure.

Expense per acre.

17 loads manure to the acre, broadcast, at $1 per load,	$17 00
Cost of cartage and spreading manure,	6 00
12 loads of horse and hog manure to the drill, at $2.25,	27 00
Team and men to apply the manure,	4 00
12 bushels seed and preparing it for planting,	10 00
Plowing, harrowing and marking out ground,	4 00
Two hoeings, four days for one man, at 75 cents,	3 00
Dropping potatoes and covering with horse and plow,	2 50
Plowing between drills; harrowing ridges down with wooden-tooth harrow,	3 50
* Digging 243 bushels at 4½ cents per bushel,	10 93
Carting to Washington market, and ferriage and loading	10 00
Commission for selling $170, ten per cent.,	17 00
Total expense,	$113 93
Amount sold per acre,	$170 00
Direct expenses,	113 93
Apparent profit,	$56 07

In this calculation, it will be observed, no allowance is made for interest of value of land, and of the other capital employed

* The potatoes were dug by contract per bushel; they might have been gathered much cheaper by ordinary farm laborers employed by the month and boarded by the proprietor.

in producing the crop, and the wear and tear of implements, baskets, &c.

The land, after the crop was taken off, was left in better condition than when before prepared for planting; the second crops receiving no additional manure, except sometimes a light application of guano.

New York, *August* 13, 1860.

CHEAP PREVENTIVE OF CANKER WORMS FROM APPLE TREES.

Solon Robinson.—I have in a letter from Malden, Mass., one of the most sensible plans for a cheap preventive of canker worms which climb the boles of apple trees, that I have ever seen. Here it is:

"Take pine boards of suitable width for four to box a tree. Cut them in pieces two feet long on one edge, and four feet long on the other edge. Nail them together in a box around the tree, with four sharp points up. The box is to be adjusted about the tree before the grubs come from the ground, and a peck of powdered lime or ashes thrown between the trunk of the tree and the inside of the box. The caustic lime or ashes will destroy the grubs near the tree, and the boxes will invite all the grubs near them to ascend and deposit their eggs. I found the pinnacles covered with grubs and eggs, and the insects apparently contented with this highest point as a safe place, and there the eggs were deposited. I then removed the boxes to a considerable distance from the trees, and heard no more from canker worms; they all died for want of proper food."

FINE SHOW OF FRUIT.

W. S. Carpenter made a beautiful show of Apples and Pears, now in season, embracing the following apples:

Sine qua non, Mahomet, Hollow Crown, Giffard, Yellow Harvest, Strawberry, Red Astracan, Sweet Bough, Early Joe.

And the following Pears:

Bloodgood, Dearborn seedling, Jargonelle, Beurre Giffard, Osborne's seedling. Also Belle de Fontenoy Raspberries in full bearing, of the second crop.

Mr. Carpenter stated that he has now growing in his orchards 200 sorts of Apples and Pears, which he has had planted within 10 years, and which will now produce a profitable crop.

GRASS FOR SANDY SOILS.

Solon Robinson.—I have a letter from Wm. Duane Wilson, of Desmoines Iowa, a postscript of which says:

Please have the following inquiry answered at the next meeting of your Institute Club:

What kind of grasses succeed best on sandy soils, such as you have in New Jersey? This is a matter of considerable importance to us in this State, as we have a considerable quantity of such soils in Iowa, which it is desirable to turn into grass lands.

As this is an important question, and one which some of the New Jersy and Long Island farmers who attend the club can answer, let us have it up for discussion at some future meeting. Perhaps some one who knows will write us about it—what sort of grass he grows, and how he grows it.

Mr. Reynolds.—The common red clover is more grown in New Jersey than any other hay grass.

Wm. S. Carpenter.—I have seen white clover grow a ton and a half per acre of hay upon a sandy loam. It is apt to be hove out and killed in winter upon all clayey soil, but not upon sandy land.

Dr. Trimble.—If a farmer will not cut a second crop, nor pasture it, it is not likely to heave out. If you dress clover heavily with grass, it will not heave out. The Jersey marl will bring a great crop of grass on any soil in New Jersey, no matter how sandy. It is the lime and potash of the dressing that produces the grass; and if grass or clover is cut before it ripens, it does not exhaust the land. Much of the land in lower Jersey has been restored from barrenness by the use of green sand marl. There is some of the pleasantest land to cultivate in Monmouth County, and there corn and grass and all other crops do grow most luxuriantly, and that upon land which was almost a barren waste a few years ago.

Wm. S. Carpenter.—The Jersey farmers practice a most thorough system of cultivation, so as to grow productive crops instead of worthless weeds. In Westchester County the farmers seem to delight in growing weeds. They allow them to grow in their gardens and fields; and, if they keep these free, they permit them to seed all along the highways and railroads.

LIGHTNING RODS.

Solon Robinson.—I hold in my hand a letter from some "Pleasant Hall" in some State, I suppose, though the writer forgets to

say what or where and also desires his name not to be mentioned, which is an unwise desire, but I will gratify it. His letter, however, suggests two or three questions for discussion, or at least, careful inquiry; and, perhaps the club will take up the question of lightning rods for discussion at some meeting during the days in which we may expect to hear it thunder. The writer makes the following string of inquiries:

Does a rod possess power of attraction from the ground to its highest point? or does that part above the building only possess the power of attraction? and what might be the rule in placing points, as to their distance apart over the ridge of a roof? In many places an idea is prevalent that the rod will protect a circumference of three times its height above the roof. Correct this, if an error. Will a thick rod be more effectual than a thin one the same length? Will the fluid melt a small rod sooner than a large one? or, is a thick rod equal or better in every respect than a thin one? If the point should be rusty, would it be worth anything as a conductor? You could not persuade any farmer that I know to allow a staple to be without a glass or horn for the rod to pass through, for fear of the electricity leaving the rod and passing into the building. Elucidate these points. Should two, three or more points be on one building? Should they all be connected on the roof with wires? and should each and every point have a rod extending to the ground, any certain distance from others? or might they all run down together. Is a solid brass or copper point as good as plated silver or gold? And is a large point with two or three smaller ones around it of any benefit, all on the same rod? And, in conclusion, give an explanation of lightning rods suitable for the country.

I hope some one will prepare succinct answers to these inquiries, to be read at some future meeting.

The Secretary.—The best protection is supposed to be green trees yet barns are often burnt, and the trees left untouched. I should like to know whether lightning rods are really protectors or not. It is a fact that barns are much more frequently struck by lightning than houses, and frequently when there are lightning rods on the building.

Mr. Cavanach stated that a church in Brooklyn, with several lightning rods, was struck and considerably injured last year.

This subject will be discussed at a future meeting, and facts

are solicited in regard to this question: Are buildings actually protected by lightning rods?

CORN.

This question of the day being called up, Dr. Trimble gave his views upon the growth of corn. He said: I find the top that contains the pollen, always precedes the silk, and if a very severe storm intervenes just at that time, it has been known to destroy the pollen so that the silk was not afterward impregnated, and consequently the ears produced no grains. Of sweet corn, he stated that he had some which he had grown many years with great care to keep it pure, and finds it so near perfection that he desires nothing better. It grows short, stout ears, with large grains, and is a very delicious food. I plant it from the 1st of April to the 1st of July, so as to have it in season for the table, during as long a season as possible.

Wm. S. Carpenter—I had last year some ten sorts of sweet corn in cultivation, and of all others I prefer the Excelsior, which grows two or three ears to the stalk, with twelve or fourteen rows to the ear, and is very rich when cooked.

TOPPING CORN.

I have an account of an experiment made by topping a part of a field and leaving part, which proves that the corn not topped yields much better than that which is topped. My practice is to cut up corn at the ground in time to save the fodder in good order.

Mr. Reynolds—I think that the grain is better upon stalks not topped, but there is a question whether the grain is worth more than the stalks, as they are sometimes very valuable for fodder.

Andrew S. Fuller—I am very sorry to find the corn question eliciting so little attention. I want to know how far apart we shall grow the different sorts of corn, and how many stalks in a hill? I want to know if there is not some varieties that will be benefited by hilling, and whether it is best to grow corn in hills or drills? In short, I want to know if we cannot elicit some facts about growing corn which will be useful to a large number of cultivators of this truly great American crop?

Dr. Trimble—In North Carolina, corn is planted about two feet apart one way, and five feet the other, two stalks in a hill. In Central New York, the Dutton corn is planted three feet apart each way. You can hardly apply too much manure to corn.

Mr. Fuller—I have seen this year large yields of corn without ears. Why? It was planted too thick. There is just as much science in growing corn as there is in growing trees or anything else, and it is an important matter to have this question settled, or rather discussed until we get more light.

Mr. Carpenter thought that it was an advantage to take off the suckers.

John G. Bergen—I have seen the experiment tried, and it was found that it would not pay to take off the suckers.

The corn question is to be continued, and also potatoes.

August 20, 1860.

Present, 49 members. Mr. Geo. H. Hite in the chair.

A NEW COTTON.

The Secretary called attention to a new cotton, of very fine, long fiber, lately discovered in Texas, that gives out 50 per cent. of clean lint from the seed cotton. It grew upon land largely impregnated with nitre-saltpeter, and from that it is thought that that will prove a valuable fertilizer for cotton upon all soils.

TRANSPLANTING FOREST TREES.

A question from Vermont is asked, whether it will do to plant forest trees in Autumn?

Wm. S. Carpenter.—I have made a good many attempts to plant both forest and fruit trees, and have always had bad success. I would not plant trees that were taken up and "heeled in" in the fall, because I have met with much worse success with such trees than with those taken fresh from the ground in spring.

Mr. Dodge, of New Jersey, said that he knew 60 pear trees planted in autumn, and only five died, and 250 in spring, and only three died.

Dr. Trimble.—I would always plant trees in the spring, if possible. If I wanted a large tree I would have it dug around in summer, so as to form a base of earth, and let that freeze solid, and then move the tree while frozen.

The Secretary said pines and cedars are best transplanted in midsummer.

Mr. Carpenter and Mr. Lawton both recommended putting stones around a newly planted tree to serve as anchors and as a

mulch. Trees should always be watered by pouring water into the hole before setting, or into a side hole that will reach the roots below the surface. Watering the surface sometimes serves to harden it and injure the tree, unless the ground is mulched.

FRUITS IN SEASON.

Wm. S. Carpenter presented the following list of fruits now in season, which he had on exhibition to-day:

Apples—Sweet Bough, Drap d'Or, Summer Pippin, Homony, Queen Anne, Hollow Crown, Red Astracan, Giffard, Early Joe, Rivers, Strawberry, Hawley, Seedling, Jersey Sweeting, Red Juneating, Healey's Nonsuch.

Pears—Bartlett, Tyson, Bloodgood, Dearborn Seedling, Summer Virgalieu, Ott, Beurre Giffard.

Also, the Feejee tomato one of the best varieties ever introduced into this country, growing very large, smooth, and remarkably solid.

SELECT LIST OF EARLY PEARS AND APPLES.

The following is Mr Carpenter's list, in their order as he would recommend:

Apples—Yellow Harvest, Sweet Bough, Early Joe, Summer Pippin, Red Astracan, Jersey Sweeting.

Pears—Doyenne d'Ete, Beurre Giffard, Osbond's Summer, Tyson, Ott, Bartlett.

Mr. Carpenter also exhibited fruit of a plant called the martinee, which is very excellent for pickles. It grows in crooked pods, six inches long, and one inch in diameter at the butt, and is the same thing that has been growing common over New England many years, or something very like it.

A NEW BLACKBERRY.

The Secretary introduced a specimen of the "cut leaf," or "parsley leaf" blackberry, grown on the place of Mr. Munson, at Astoria, which some persons think superior to the Lawton variety. This specimen was certainly very fine, possessing a peculiar flavor, which was much approved by all of the fifty ladies and gentlemen present.

Dr. Trimble inquired how to pick blackberries, so as to always get them fully ripened.

Solon Robinson replied, "tickle them off." The Lawton blackberry often appears fully ripe to the eye, when quite unfit to eat.

When in full perfection, the berry will fall from the stem by a slight touch—that is, it can be tickled off.

Mr. Lawton corroborated this statement, and he also exhibited the parsley leaf blackberry, and spoke highly of it, but stated that the vines are very thorny It grows finely when trained over an arbor. The vines never sucker, and are propagated by bending over the tops and burying them.

Mr. Carpenter stated that it has been called a hybrid between the blackberry and raspberry. Its flavor indicates such an origin. It is certainly a very ornamental plant.

The Chairman said that it was very far below the Lawton in all good qualities.

Mr. Carpenter differed in this opinion, and thought it altogether worthy of cultivation.

Dr. Trimble.—The running blackberry is a most delicious fruit. Will it bear cultivation?

Mr. Hodge.—I have this year seen on Long Island this running blackberry, growing in a cornfield, where the vines were cultivated, and the produce was vastly improved in every respect.

THE NAME OF THE LAWTON BLACKBERRY.

Solon Robinson.—A good deal has been said and printed about Mr. Lawton giving his name to that particular blackberry, which originated at New Rochelle, and by some is called after the name of that place. Now I wish to exonerate Mr. Lawton from all censure in the name of that berry. If there is any sin in the name, I beg that it may be laid at my door, as I am the one who proposed in this club, in concurrence with the secretary, to call it after the name of the man who first brought it to our notice; and I believe I was the first person who printed the name of "Lawton Blackberry;" and as I like the name, as shorter than New Rochelle, I shall stick to it. It was named in compliment to Mr. Lawton, but not at his instance; for, in fact, at that time I had no intimate acquaintance with the man. I did it to give honor where it was due, and to encourage others to cultivate and improve new or old fruits, and bring them into public notice. I took the responsibility of the name, and I am willing to abide by it to the end.

FRUIT ALONG RAILROADS.

The secretary recommended a law to make all the railway companies plant the road borders with small fruits. These running blackberry plants would be good things to plant upon rail-

way embankments. I would like also to see pears plenty enough to feed the whole population.

LIGHTNING AND BARN-BURNING.

This was one of the questions appointed for discussion to-day, and was introduced by the secretary, who read the following paper:

"Are barns more often struck by lightning than other buildings? The United States now contains about 30,000,000 of people, with about seven persons in each of say 4,200,000 dwellings. About 5,000,000 farmers, with same proportion of persons have about 700,000 barns. At this ratio, there might be more than four times as many dwellings struck as barns. The facts can be ascertained. The impression has long been, that when barns have their harvest in they are attractive of the fluid by the medium of the gas from their contents ascending. The object of the inquiry is the means of security. Single rods are apparently not always reliable. It is not doubted that an extensive spread of metal diffuses lightning. Are buildings safe with metal roofs? Flag-staffs have been torn to pieces on their tops, and no mark of injury left about the dwelling. Then for economy, place a stout rod on the center of a wooden roof, and attach to the bottom, where it touches the roof, a number of telegraph wires, carried in many directions to the ground. Would the stroke on the centre rod be carried safely off by such radii? If so, the plan is vastly cheaper than an entire metal roof? Faraday experimented on iron cages suspended in air—in one of them a man; in another small cylindrical one, a mouse. The cages powerfully charged with electricity, produced no effect on the man or mouse. The plan of one central rod, with many wires covering the building, may produce like results. The American Institute will be glad to record in its transactions all proper statistics as to these questions."

Mr. Carpenter stated the fact of two barns being burnt this season in Westchester county, which had as good rods as could be provided. He also stated the fact that locust trees were oftener struck than any other trees.

The secretary stated that it was a very rare occurrence that anything in this city was ever struck.

Mr. Dodge of New Jersey, thought that the best way to preserve buildings from damage was by lightning rods. He thought iron roofs attracted the fluid and conducted it off by the leaders.

Solon Robinson related a fact of his being struck in a house furnished with a lightning rod, which proved no protection. But the question is, how shall we protect our barns? If lightning rods will not do it, the question is what will? I believe trees are very valuable protectors, when electricity comes down from the clouds. Does it always?

The Secretary.—My experience shows that the tearing of trees by lightning is upward, so that the force comes from below and not from the clouds. And the tearing follows the grain of the wood.

Mr. Carpenter stated that, in one case, he had seen a tree where a bolt had apparently gone right through the body.

Mr. Lawton.—One insurance company that I insured in made a considerable reduction upon buildings provided with rods.

Mr. Latson.—I use no rods upon my buildings, but I protect them by tall tree. I have had several tall Lombardy poplars torn in pieces, and they probably saved the barn. The lightning rod near by did not attract the fluid, and I took it down.

THE TEAK AND OTHER TIMBER.

The secretary made the following statement in relation to timber:

Donald McKay, the distinguished ship-builder, Boston, declares that our oak timber is fully equal, if not superior to the British or French. British gun-boats four or five years old, from the best ship-yards, are now rotting to a frightful extent. We have nothing like it. Italian oak is far superior to English. Our packet and clipper ships run for years, and show no weakness. Our live-oak is of established reputation for durability and strength. It is believed that only one timber on earth is more durable—the Teak, of the Indies. Lindley, in his "Vegetable Kingdom," places Teak in his 256th order—the Verbenaceæ—as *Tectonagrandis*, and as an enormous tree, with deciduous leaves, covered with rough points. It inhabits the mountains of Malabar, Pegu, and others, in the East Indies. Its timber abounds in particles of silex, and has no rival in Asia for durability. With much the appearance of mahogany, it is lighter and very strong. Our country must grow Teak! It is worth more for utility, for structures on land and sea, than any other timber, ten times over; beautiful masts are made of some of the trees.

August 27, 1860.

Present, 60 members. Dr. Trimble, of New Jersey, in the chair.

DOMESTIC WINE MAKING.

Three weeks since, Geo. H. Hite presented to the Club some samples of domestic wine, which were tasted and highly approved by the ladies and gentlemen present. They were also submitted to a committee to report upon, and the following is their report:

The committee on wines exhibited by Mr. Hite, report—

1. That the Isabella wine, marked 1856, represented as pure juice, without sugar, is of *very superior quality.*

2. The specimens of currant wine of 1857, are also of excellent quality—one bottle is sweeter than the other, but both are *good.*

3. The bottle of "claret" wine of 1858, from elder-berries, has some of the qualities of Port wine; nevertheless, the flavor is not agreeable to your committee.

4. The black currant wine, 1856, may have also valuable medicinal qualities, but is not of agreeable flavor. Submitted.

J. G. BERGEN,
R. G. PARDEE,
H. MEIGS,
Committee.

TO MAKE CURRANT AND OTHER WINES.

Mr. G. H. Hite—The currants should be perfectly ripe when gathered; they should be stemmed and washed before pressing, which should be done as thoroughly as possible with a twelve-inch cider press. Ascertain the amount of juice thus obtained, and then add that amount of water to the same pomace, and incorporate the water and pomace well together; let it stand a few hours and press it again. By this process an additional quantity of juice, though not so strong, is obtained; then mix the first pressing with the second and weigh a gallon of it, and whatever it falls short of ten pounds to the gallon, add enough of good Havana sugar to make it weigh ten pounds, and so on of the rest. I would here remark that an additional amount of sugar added to the above will make a sweeter wine, and perhaps more suitable to the taste of many.

It would be rather an expensive business to those who have but few berries, to make currant wine from the first pressing of

the currant alone, as it requires one bushel of currants to produce a little over three gallons of pure juice. The red currant pure juice weighs three and one-half pounds to the gallon. The white currant juice comes almost within the wine-maker's rule, weighing nine and one-quarter pounds to the gallon. The way in which I make currant wine, is to use the pure juice alone or without much water, and I find that I can readily command $3 per gallon for it, whereas the other would be dear at $1 per gallon, and not much of a wine at that.

Elderberry wine is made in the same way as first stated, adding about half water, in the way of repressing the pomace, &c., as if it is made without the addition of too much sugar, it resembles claret very closely.

Black currant wine is made in the same way as the elderberry, only the berries should be scalded before pressing, and if carefully managed in the fermentation, will resemble the Rhine wines.

When the juice, sugar, and water are well incorporated by stirring together until the sugar is dissolved, it is then placed in an open tub, in a temperature of about 60 deg. F., there to stand a few days, until the froth and impurities rise to the surface, which must be removed as often as it accumulates, and when the liquid becomes limpid and somewhat transparent, then it is placed in a clean barrel to within five or eight inches of the bung. A tube, somewhat in the shape of a syphon, or more in the shape of an ox bow, made of glass, is inserted into the bung about two inches, and made air-tight by means of small wedges of wood and wax, &c. The other end passing into a pail of water to the depth of three or four inches. This is done to prevent the oxygen of the air penetrating the fermenting mass, and also to retain much of the finer aromatic essences which are so essential to the fine flavored-wines.

A great advantage is also gained thereby in rendering it less necessary to keep watch over the fermentation as pursued by some in keeping the barrel bung full by replenishing with some of the same standing near at hand, which becomes pricked before fermentation has ended, rendering it in the end little less than sweetened vinegar. No admixture should be attempted after fermentation has commenced, and if the temperature of fermentation is kept at about 60 deg. or 65 deg. F. for about six weeks or two months, it will be ready to remove the tube and fill the barrel full of the same, made in a separate vessel for that purpose.

Then put the bung in moderately tight for a few days, and after that drive the bung in tight until about December, when it must be racked off from the lees; the barrel rinsed with hot and cold water, and when drained quite dry insert into the bung-hole a small cup, suspended by a wire, containing one ounce of spirits of wine or alcohol, ignited, and kept there until the barrel is well fumigated; (the bung must not be closed.) Then return the wine again and keep it there for three months, when the same process is repeated. If it is done a third time it will be all the better. It is now finished and can be kept for any length of time, either in bottles or wood, slowly improving by age.

Grapes may be made into wine in the same way as first mentioned above, with this difference, that when the pomace is to be re-pressed, that sugar dissolved with grape juice (by heat) must be added to the water that is mixed with the pomace, and to stand a few hours before the second pressing. It must contain the same proportion of sugar and water as is found in the natural juice of the first pressing, all of which is mixed well together and fermented as above. But, if the grapes are left on the vine until they are quite ripe, say until they have received the effects of a white frost, and carefully selected, the good from the bad, and thoroughly pressed and fermented as above, without the addition of either sugar or water, you will have wine that is wine. It is true, we cannot have so great a quantity of juice, but what there is, is good. Glass tubes can be procured at Hagerty's, No. 8 Platt street, at a moderate price.

VARIETY OF FRUIT.

Mr. Carpenter advocated a great variety of fruit, because it incites increased quantity much more than it would if there were but few sorts. Besides, almost every neighborhood has its favorite sort of apples or pears.

The Chairman and Mr. Lawton were both opposed to cultivating such great varieties. There may be 500 sorts of apples, yet it is not worth while for any man to try to get a full assortment of those now on the nurseryman's catalogue.

Mr. Cavanach mentioned one nurseryman who had 150 pears on his catalogue, and yet there were not three of them worthy of general cultivation. He thought it much better to confine attention to fewer sorts.

Dr. Trimble.—I do not object to amateurs originating new va-

rieties, or making new collections. I once tried to grow forty-five sorts of French pears. When they fruited, I only considered five worth keeping; and that is about the proportion, I think, that gentlemen will generally get if they order a general assortment of fruit trees from a nurseryman. Among plums, I would take first the green gage, and next the melon plum, and third, some late-ripening German plums. The best early apple is the bough; then the fall pippin. If we can find out the best, and reduce the number for general cultivation, we shall do the country a good service.

Mr. Cavanach.—We have upon our nurserymen's catalogues a great many apples and pears that are utterly worthless. The best place to select fruit is at our great fruit shows.

The Secretary.—The best of all pears is the old butter pear, as we had it in perfection sixty years ago.

COMMITTEE TO NAME FRUITS.

Dr. Trimble, Wm. S. Carpenter, Andrew S. Fuller, R. G. Pardee, Peter B. Mead. Adjourned.

HENRY MEIGS, *Secretary.*

September 3, 1860.

Present, 50 members. Mr. Pardee in the chair.

THE CUT-LEAF BLACKBERRY.

The Secretary, Judge Meigs, read a letter from Mr. Munson, of Astoria, who attributes the origin of the above blackberry to France. He considers it superior to the Lawton, when cultivated on trellises upon dry ground. It does not do well upon moist ground. He advises the rows to be eight feet apart, and he uses galvanized wires for supports.

PRODUCTS OF LAKE SUPERIOR.

Mr. Disturnell exhibited to the club some remarkably fine specimens of wheat, in the straw, as it grew in the neighborhood of Lake Superior. He states that wheat has grown there this season to great perfection, and that it is likely to become a very fine agricultural country. He also exhibited several specimens of the natural growth of that region, and gave statements that were very satisfactory to those present. The natural vegetation f the Lake Superior region, he said, was very luxuriant. The

snow falls very deep, but the land does not freeze but slightly, owing to the snow falling early. Wheat, rye, oats, barley, peas, beans, potatoes, and many other food-plants flourish well. Only June, July and August are free from frost. The snow falls usually about the middle of November, and covers the ground so that potatoes do not freeze when they grow. Mr. D. thinks this city deeply interested in the Lake Superior region, not only on account of its minerals, but its future agricultural products.

EARLY GRAPES.

Mr. Dougherty, of New Jersey, presented some Hartford Prolific grapes, so well ripened as to be quite eatable.

THE WILD CHERRY (CERASUS VIRGINIANA).

Wm. S. Carpenter presented a specimen of this fruit, greatly improved by cultivation. He stated that such fruit is worth $5 a bushel at the present time in New York.

THE JAPAN MELON.

Mr. Carpenter showed specimens of this kind of muskmelons, which he considers superior to all other.

GREAT PRODUCTIVENESS OF FRUIT.

Mr. Carpenter showed some branches of pears, which bore from 20 to 27 pears in a space of ten inches in length, almost as close as ropes of onions. The production of fruit in the east part of Westchester county is the most remarkable ever grown. Many trees are breaking down with their enormous loads of fruit.

FRUIT IN CENTRAL NEW YORK.

Mr. Pardee stated that he had been traveling a good deal in the interior of this State, and he found that the sayings and doings of this club are proving of great advantage to the country. He has no doubt that the cultivation of fruit has been largely increased by what has been talked about here. The crop of fruit of all sorts in Central New York is very large. One gentleman was offered $800 an acre for five acres of grapes now growing, which he refused. Girdling vines, or girding the limb by a twine, is resorted to for the purpose of increasing the size of grapes. The plum crop of Central and Western New York is very remarkable this year. Many orchards not having been touched by the curculio.

LIGHTNING, AND BARNS DESTROYED BY IT.

Mr. Gilbert stated the following fact lately published in regard to lightning. A very heavy crash fell upon or over a house a d

barn in New Hampshire, which melted the points of new conductors, and apparently dissipated the fluid so as to prevent damage, though the barn appeared to be filled with the fluid.

The temple at Jerusalem stood ten centuries without being injured. But this building had a great deal of metal about it, and perhaps conductors for water that carried the electricity from the roof to the ground. Yet we have many instances in this country where buildings have been struck that were fully provided with lightning-rods. This may be owing to bad construction of the rods. In the case of a great explosion, like the one in New Hampshire, it is not likely that a single rod could convey all the charge to the ground. If a rod was full of points along its length, it would serve to dissipate the charge; and a square rod is better than a round one.

The Secretary.—This question of lightning was started to gather facts showing how to save the farmer's barns from destruction, which are much more likely to be destroyed than any other building, and the loss is much greater.

Adrian Bergen, of Long Island, related one case of a barn apparently saved by the conductor. The force of the shock was so great that a man in the barn was knocked down. The rod was a small, round one, fastened to the barn by wooden supports. After the explosion, a hole was found at the foot of the rod.

Mr. Lyon thinks the community does not sufficiently appreciate this question—how to protect farm buildings. The underwriters offer a premium to ship owners to put conductors upon vessels, yet there is not one in a hundred provided.

Mr. Carpenter—The farmers in my section have no faith in lightning rods, because the proportion of barns that have been struck with rods upon them, is greater than those without conductors.

The subject was further discussed without eliciting any very important facts, and will be continned, probably with the same result.

GRAPE CULTURE.

Letter from Ira Smith, dated

PEORIA, Ill., *August* 16, 1860.

I have a hundred Catawba grape vines, which I cultivate on poles the usual way. Having all my grapes destroyed last spring by a late frost, and being desirous to increase the number

of vines to enlarge my vine-yard, I buried all my last year's wood, and allowed an extra vine on each trunk to grow from a point near the ground, which I have also buried. The side branches of the old and new vines are taking root and growing finely, and have not at all hindered a heavy growth for next year's fruit of from two to three vines climbing up the poles; but some of my neighbors inform me that the side branches, commonly called suckers, will not produce good bearing vines; I therefore resort to the Farmers Club, New York, to settle that question.

Andrew S. Fuller—It will not make the least difference whether the bearing vines are taken from such suckers as the writer mentions, or from the main stalks.

A LONG ISLAND POTATO CROP.

Wm. S. Carpenter read the following letter from John McKann, of Gravesend, Long Island, giving a detailed account of a crop of potatoes grown this year:

"My ground was plowed deep, and made mellow, furrowed two and one-half feet apart. I then sprinkled three hundred pounds sifted Peruvian guano in the bottom of the furrow, and on top of the guano four loads of stable manure, and then after cutting thirteen bushels of potatoes to two eyes, dropped them, fourteen inches apart, on the manure, then covered the potatoes about three inches deep. As soon as the potatoes were well up, I plowed and hoed them. The plow was run through them twice afterward. The fourth and last time, I applied a home-made double mould-board, and fastened it upon the top of the iron mould-board. This wooden mould-board is six inches wide, and extends ten inches back of the plow, so that in passing between the rows the dirt is thrown quite up to the vines, and covers all weeds. This comprises the whole labor of cultivation.

Cost of plowing, per acre	$2 00
Cost of planting, per acre	3 00
Cultivating the same	3 00
Cost of 13 bushels seed, at 50c. per bushel	6 50
Cost of 300 pounds guano at 2¾c. per pound	8 25
Four loads stable manure at $1 per load	4 00
Digging 245 bushels potatoes, at 6c. per bushel	14 70
Total	$41 45

"Two hundred and forty-five bushels potatoes sold for fifty cents per bushel, $122.50.

"The variety is red cups, a fine potato, cooking white and dry. I shall now sow this ground with wheat, and seed it down with grass, using a small addition of manure, with a fair prospect of a good crop of wheat next July.

September 10, 1860.

Present, 59 members. Mr. Wm. S. Carpenter in the chair.

A letter was read from Mr. George G. Fosshet, West Stockbridge, Mass:

"I have been an attentive reader of the discussions in the Farmers' Club, and have derived no inconsiderable amount of information from that source within the past year. I have been informed that it is customary for those desiring information, to address questions through you or some other member to the Club. I have therefore taken the liberty to inclose herein a specimen of a weed or plant, which I should be glad to have you exhibit before the Club, that they may discuss and answer the following questions for the benefit of farmers in this and the adjoining counties in the State of New York. The plant grows from eight to eighteen inches high, covering the whole ground in a dense mass, to the exclusion of all kinds of grass and grain. When it has once taken root, it will frequently over-run whole fields and even farms, to the great damage of the owners. The questions which I propose to ask, are: What is the name of the weed? What is it good for? What will destroy it or prevent its growing?

"Also the following additional questions:

"At what time of year should the seed of evergreens be sown, as, for instance, Arbor Vitae?

"How can seed be raised and saved to produce double flowers, when the double flowers do not produce seed; or how can double flowers be made to produce seed such as balsams, dahlias, &c.?

"I have tried in vain to raise seed from the Camelia-flowered balsam, but I find the double flowers do not produce seed, but only single blossoms, and I very rarely succeed in getting seed from a fine double dahlia.

"If there is any way that can be divulged to us people here in the country, whereby we can save seeds from such flowers, we

might cultivate them without the trouble and expense of sending for seeds at a distance every year, and we should be very grateful to learn.

"P. S—This weed gives out a very unpleasant smell, and is known here by the name of stink weed."

Mr. Carpenter.—It is known in Westchester county as wild flax or butter and eggs. The only way to eradicate it is to turn it under while in blossom. It is very hard to get rid of, and is a great pest, crowding out every other plant.

Prof. Mapes.—You may get rid of this and many other noxious weeds by salting the land. I have used salt for this purpose to the amount of 150 bushels of salt to the acre, upon small patches. Probably 50 bushels would destroy this weed.

Andrew S. Fuller.—The proper name of this plant is *Antirrhinum Linaria*, of the Snap dragon family.

EVERGREEN SEEDS.

In answer to the question about such seeds, Mr. Fuller said, keep the seeds of Arbor Vitæ dry and cool till spring, and then plant in fine leaf mould in a shady place. Norway spruce seed and pine, hemlock and juniper, should be kept in sand as it comes from the bank, in boxes in a cellar, and in spring, plant in shady or half shady spots. Dahlia flowers should be pulled out from the outside as fast as the petals decay. Asters in the same way. Carnations should be pulled from the center.

Wm. S. Carpenter.—I planted a lot of evergreen seed in spring, and lost nearly all by the heat of the sun. I afterward saw a man who practiced growing the seeds among oats, and was successful.

Mr. Fuller.—This is a bad way. You cannot get good plants. They should be grown in a shady spot, and carefully cultivated and kept clean. It is easy to shade by an awning. The juniper family do not vegetate the first year. The common red cedar seed may be made to grow by scalding.

Mr. Cavanach.—I have seen a large bed of evergreen seeds grown this year under an apple tree. Part of the bed was shaded by green limbs laid on the ground.

Several members concurred in the opinion that evergreens cannot be successfully grown by transplanting from the forest. Those from the seed, after transplanting several times, almost always live when put in the place where they are to stand, while those from the woods more than half fail.

RICH PRODUCTS OF WISCONSIN.

Jonas Tower, of Ivanton, Sauk county, Wisconsin, sends us some specimens of the growth of farm products in that section of the rich west. First is a stool of rye, 180 stalks, which grew from a single seed, among wheat, upon newly-cleared land, and produced five and a half ounces of grain, which is sent as a sample of its quality, and to be used for seed. I ask Mr. Carpenter to take it, and see what it will produce. Then there are heads of timothy of remarkable length, but not as long, Mr. Tower says, as he has seen. Some of these measure over ten inches.

The heads of winter wheat show that Wisconsin has the power within her rich lands to produce great crops of winter wheat. These heads measure six inches long.

And here is a stalk of clover that was sown upon the wheat ground, April 23, and pulled July 17—eighty-three days. It is full sixteen inches in length. With it is a sample of clover seed grown in 115 days from seed sown among the wheat. Here is a sample of the wild hops of Wisconsin, large in size, and well filled with that peculiar yellow powder, which alone gives value to the hops.

And above all things else worthy of notice, by those who desire to send things here for our inspection, is the manner in which these were put up; each in its strong paper wrapper, distinctly labeled, and all compactly put up and plainly directed, and sent by express, freight paid.

BENEFIT OF CLEANING SEED WHEAT.

Mr. Tower, the gentleman who sends the above named specimen, says:

"I passed my seed wheat twice through my smut machine, and in 105 acres I have not discovered the first trace of smut in it, and it was nearly all fall grain. My neighbors, who have had their seed wheat cleaned in the same way, tell the same story about theirs."

Will farmers please to make a note of this fact? If you want to grow smut, sow it. If you prefer to have clean wheat, sow nothing but clean wheat for seed.

The exhibition of this remarkable stool of rye elicited a pleasant discussion upon the subject of cultivating grain in hills. Prof. Mapes and Mr. Pardee spoke of the Louis Weedon method of growing wheat in strips, cultivating the spaces.

Prof. Mapes.—Mr. Smith, the originator of the system, has experimented fourteen years, planting them in rows ten inches apart, and then left a space of thirty inches, which was worked with a horse hoe, and now gets thirty-four bushels per acre without a particle of fertilizing matter, simply reversing the ground every year, sowing where it was cultivated one year, and cultivating the ground that grew the grain last year. It has been proved by these experiments that it lets in air and moisture sufficient to convert the inert material in the soil into wheat food. He finds also that the use of fertilizers increases his crop twenty per cent., so that he find warming profitable, as well as working the soil. He has found the advantage of subsoiling his land, for that enables him to sow much thinner than ever before, the plants tillering largely. So it is in this country—meadows run out that are not subsoiled, while those that are subsoiled do not run out, because the plants can tiller, and by a slight annual fertilizing the meadows continue productive. Old meadows may be renewed without breaking up, by merely running a subsoil plow through the sod. I have practiced that plan to great benefit.

CELERY.

Mr. Pardee spoke of a new plan of blanching celery by saw dust.

Prof. Mapes.—We blanch our celery by taking it up and laying it on the ground, buts to buts in the center, and covering it like a potato heap. In winter, when we want the celery, the mound is upset by a crowbar, and the celery taken out and sent to market. It keeps well and blanches well in that situation.

LIGHTNING-PROTECTION OF BARNS AND FARM BUILDINGS.

Solon Robinson.—I have mostly abstained from participating in the discussion of this question, because I have very little faith in lightning rods as protectors. As they are most commonly constructed, they are not what they are generally conceived to be—that is, attractors of an approaching thunder bolt, picking it up on the sharp points, and conducting it down a carefully insulated rod, to a safe deposit in the earth. If a lightning rod ever performed such a service, I should like to be assured of the fact. At present I have no faith. I believe that, when the atmosphere is surcharged with electricity, any metallic substance will absorb it just in proportion to its natural affinity, and if

there is an excess of fluid in the air around the top of a rod, it will run down it to the earth, just as it runs along telegraph wires; and experience has proved that a bright sharp point is more attractive than a blunt one.

Still, a blunt rod will become charged, and so will a metal roof, and, more than all, an iron building, and the water conductor, or whatever other metallic substance reaches from the top to the earth, will tend to dissipate the excess of electricity in the air above and around the building, and prevent an accumulation of it sufficient to produce an explosion. But I have not one particle of faith that any building that happened to be situated in the path of what we call a thunderbolt, ever was saved by the best lightning rod ever erected. And if in its course the discharge from the cloud, coming like a rifle ball from the muzzle of the gun, happens to strike the sharp point of the rod, it is to my mind a preposterous idea to suppose that perfect insulation of that rod from the building can be of any possible advantage.

Thus far had I written, when the September number of *The Working Farmer* accidentally was taken up, and the first thing that attracted my attention was an article under the head "Protection from lightning." From this I make a few extracts pertinent to the subject. The writer says:

"There can be few subjects of equal importance less generally understood, or perhaps more universally misunderstood, than the science of electricity in its application to lightning rods. The errors of the past are very slow of eradication, although it must be admitted that progress has been made since the famous discussion in George III.'s time, as to whether lightning rods should be pointed or blunt at the top. So little is known of electricity itself, and so largely is it a purely speculative science, that it is no wonder that doctors disagree.

"It is clear that the most valuable opinion on this subject is to be looked for from those who have made the study of electricity and thunder-storms a specialty, with the practical result in view of ascertaining the most effectual means of protection, and it is to be remarked that those who havo done this, have arrived at similar conclusions.

"It is a common error to suppose that lightning rods should be insulated, and a very natural one, arising from a superficial view of the subject. It should be remembered that currents of electricity in a rarified state are continually circulating through

masses of matter, silently and without producing any manifest effects; the effect of insulation is to interrupt the flow of these currents, whereas the lightning rod ought rather to be so contrived as to facilitate their free passage from the building to the rod, and thence to the atmosphere, and vice versa.

"During that disturbed electrical condition of the atmosphere, which we call a thunder-storm, these currents circulate in greater volume and rapidity, and a sufficient interruption of them brings about a discharge of lightning.

"At such times the insulation of the rod from the building is a most excellent device for causing an explosion of accumulated electricity either from or into the building, as the case may be. The rod, on the contrary, ought to act somewhat as a safety valve as regards any electrical disturbance within the house, neutralizing it gradually, and thus preventing an explosion.

"Should the rod be struck by lightning, its efficacy in carrying off the shock will depend on whether it presents a continuous chain of conducting matter in the line or direction of the discharge, which is superior to anything within the building. If it does not, all the glass in the world will not prevent fluid from leaving the rod and passing through the building on such conductors as it may find there.

"The true theory or purposes of the lightning rod is to facilitate electricity in following out its natural laws and tendencies, and nothing can be more truly unscientific or practically absurd than the idea of presenting a barrier or obstruction to lightning?"

All my reading and observations so far has taught me that this is the true theory; and, happily, to confirm me in it, I have received the following letter at the very moment while engaged in penning the above. It comes from S. D. Cushman, of South Bend, Ind., who has made electricity a study, and the following is his opinion about lightning rods. He says:

A conductor for the protection of life and property from the effects of lightning, should be so constructed and applied that it will add to the conducting power of the building, so as to admit of the most intense discharge being securely transmitted without explosion or damage to the building or structure.

Attraction.—The utility of a lightning rod does not consist in its attracting power.

Insulation.—The conducting power of a lightning rod is frequently diminished by insulation, and never is increased; it

should never be insulated. It may be fastened to the building with brackets of wood or staples.

Points.—The attaching to the upper end of a lightning rod a copper, silver, gold, or any kind of a point does not add to the utility of the rod, but when attached always diminishes, more or less, the conducting power of the rod by breaking up the perfect continuity that a rod should possess, and interrupting its polarity.

Size.—An iron lightning rod should never have less than three inches conducting surface, possessing solidity sufficient to have strength and durability.

Construction.—A lightning rod should not possess in its construction sharp edges—neither should it be in sections or pieces, (the sections or pieces being hooked or screwed together) but it should be all in one piece, possessing an equal, even, unbroken surface in its whole length.

Application.—In the application of the rod to the building the conducting power of the building should be brought into the general line of conduction; that is, the rod should come in good metallic contact with all the important metallic substances upon the outside of the building, such as gutters, spouts, &c. That part of the rod that comes in contact with the earth, should be increased in its surface and conducting power, so that there will not be less conducting surface in contact with the earth than is exposed to the building and atmosphere, and care should be taken, that the earth around, and in contact with the rod is always moist.

Shade Trees.—Shade trees should not be relied upon as a protection from lightning, because their conducting power varies so much, and very often, when in their best conducting condition, they are damaged by the lightning passing over them. The conducting power of shade trees then should be increased and made permanent by the application of an iron or copper wire.

Errors.—One of the errors committed in protecting from lightning is an improper estimate placed upon the conducting power of the building, compared with the material used for protection. When a lightning conductor terminates or ends in a substance of imperfect or less conducting power, it is reduced to the conducting power of the body in which it ends.

Dry earth is a non or imperfect conductor. Earth owes its conducting power to water. According to Cavendish, the con-

ducting power of iron, as compared to the conducting power of water, is as four hundred millions to one. The electrical size of the mass of lightning rods are not as large as a common knitting needle, being reduced by so small a portion of the rod's surface coming in contact with damp earth.

Another error is in constructing the rod in sections.. Rods properly applied of perfect continuity, being all in one piece, without coupling or hooking, have never failed to carry the quantity of electricity that may have passed upon them safely and successfully to the ground; while the sectioned, or the rods hooked or screwed together by burs or nuts, have frequently failed to do their duty. Scarcely a day or a week passes during the summer months, but we hear of the failure of the coupled lightning rods.

However well the faet of electrical conduction may be known—however well scientific men may be agreed that by the judicious employment of metallic bodies we may increase protection against lightning, certain it is that they have taken too much upon trust, and neglected the investigation of the facts.

Men, ignorant of every electrical principle, have professed to furnish security against lightning until the scientific electrician who attempts to sell lightning-rods is received with jeers and contempt as an attempted swindler; his story is listened to with impatience, and his presence considered an intrusion.

The rod he recommends is made of four copper and four iron wires laid together, with a pointed cap on the top, and some metal plates at the bottom. There must never be a splice in the wire, but several wires carried up from the ground in the main body, may be taken off and connected with the metal roof of a building, or with other points.

The following extract of an article in *The New England Farmer* was also read.. The writer says:

"I sat and saw the streaming fire issuing from the clouds and coming down in every fantastic shape, some zigzag, some in such large bolts as to split into branches, but all tending directly to the earth, to the horror of all people, and more especially of those who had barns well stowed with new hay. The shower continued till near night, with a frightful roaring and violent discharges of heaven's artillery, till every one seemed to be impressed that the damage must have been very great in the destruction of life and property as far as the shower extended.

"Reports have been afloat that barns were struck in the towns

of Andover, Middleton, Reading, Danvers, and other places. It would be very gratifying to many others as well as myself, to be informed in the reports of these barn-burnings, how many had lightning conductors on them, or whether they were all destitute of lightning rods. There seems to be a prevailing interest in the public mind in regard to the utility of lightning rods. The best evidence is a statement of facts, and the best way to come at facts is to know whether those buildings which were furnished with rods were entirely exempt from disaster, or whether the lightning made no discrimination between protected and unprotected buildings. Some people are of the opinion that the attractive power of the rods is very limited and feeble, while others have great confidence in their power; if we could obtain the statistics of this and part years from every person in the State who has had a building struck by lightning, it would furnish us with knowledge we much desire."

This question was discussed to considerable length—one speaker advocating several points at the top of the rod, which should be perfectly insulated. He very earnestly recommended "Otis's patent lightning rod," but gave no very important facts, though a great many words. He is fully convinced that man can control the lightning. He advocated points and conductors all over the building. Still, he did not believe that a lightning rod has any attractive power.

Mr. Cavenach said he saw two of these Otis rods put up this season, only six inches in the earth, and he asked if that could possibly be of any account as a conductor. So also several of the insulators were broken, and he wanted to know what benefit such insulators were. He did not get a satisfactory answer.

Mr. Pardee introduced the following resolution:

Resolved, That persons here or elsewhere who have facts, fallen under their own observation, proving that lightning rods are useful or otherwise as protectors to buildings, are requested to communicate the same to Henry Meigs, Esq., Cooper Institute, New York.

This was adopted, and it is hoped that it will be acted upon.

Adjourned.

HENRY MEIGS, *Secretary*.

September 17, 1860.

Present—Sixty members. Mr. Andrew S. Fuller, of Brooklyn, in the chair.

Judge Meigs, the Secretary, read the following article upon the Isabella grape. It is an extract from the Cincinnatus, published at Cincinnati:

"Nearly forty years ago, William Prince the elder, of the Flushing garden, gave to Mrs. Isabella Gibbs, of Dorchester, S. C., the credit of introducing that fine native grape at the North; in consequence of which it has ever since been known by the name of the 'Isabella grape.' I then knew that the claim was groundless—for in the Southern States it then had perhaps fifty local names. I felt willing that Mrs. Gibbs should become its godmother, but I could have proved at the time by every octogenarian at the South, that it was the very first grape he recollected to have seen in his childhood, skirting the paternal yard under the name of the 'English grape.' In 1802 it was the first to gladden my boyish eyes. As my travels extended in the Southern States, I met it in all sections, even among the Cherokees, where the vines seemed to be of great antiquity.

"The Isabella grape is, in fact, a sprout or *freak* from the *Vitis Labrusa* or *Fox Grape*, and has been perpetuated by its cuttings; which branch of horticulture the Cherokees well knew, but not engrafting. I have written this because one of William Prince's successors at Flushing has professed to have made the discovery that the Isabella was of Northern origin.

"(Signed) SILAS McDOWELL."

The Chairman stated that this statement was undoubtedly wholly true.

Judge Meigs also read several other extracts from papers, one of which upon "planting grape cuttings," says that short cuttings are preferable to long ones, it appeared too that shallow planting is preferable too deep planting.

The Chairman corroborated this statement. He prefers to use but one eye, and even half an eye will grow.

Wm. Lawton also corroborated the fact in relation to short cuttings, from his own experience. The bud, he said, of a grape vine is in itself a perfect plant, the bud containing leaves, fruit, &c., in embryo.

LIST OF PEARS.

The Secretary read the following extract from the proceedings of the Cincinnati Horticultural Society:

Mr. Hazeltine recommended nine varieties of pears for profit, viz: Early Catharine, Doyenné d'Eté, Bartlett, Julienne on Quince, Napoleon, Beurré d'Amalis on Quince, Winter Nelis and Seckel.

F. G. Cary recommended the White Doyenné for superior quality, and as a healthy and long-lived tree.

Dr. Edward Taylor, President of the Cleveland Horticultural Society, writes that the Diana grape succeeds well there, but the Delaware is a feeble grower, and the Catawba does not perfect itself there. He thinks the latitude affects, but the constituents of soil more.

Note by Meigs.—The Isabella was made public by Mr. Gibbs, as the New Rochelle blackberry was by Lawton, and thousands of other plants by botanists, who had a right to give them names, although millions of men have seen all of them for ages.

The bark of the Washingtonia Gigantea, 17 inches thick, was exhibited. We are glad that our grand national tree shall bear that glorious name, instead of those imposed on it by European botanists.

CAPE OF GOOD HOPE NEWS.

The Secretary read the following extracts from late news from the Cape of Good Hope:

"Accounts from Oudtshorn state that fine rains have fallen, and the Karroo resembles a flower garden. Meat is plentiful, and so fat that it is hardly eatable, and the prospects of the next harvest highly encouraging.

"Our next agricultural show will be at Worcester. Premiums to £600.

"We are having a new handsome library room.

"Our two great staple articles of export are wine and wool. Our Cape wines require a large admixture of spirits to preserve them on the long voyage home.

"WHEAT.

"South Africa might be a large exporter of it, for there is no country in the world where the soil and climate are so favorable to its growth."

THE DELAWARE GRAPE.

R. G. Pardee—I have lately had the opportunity of testing the Delaware grape. I find the vines very vigorous, the bunches very large, and fruit highly delicious, and ripe near this city ten days ago. I am more in favor of the Delaware than I ever was before. I do not find any want of vigor.

Wm. L. Carpenter—My Delawares are ripe and very delicious. But the Diana grows better, larger bunches, and larger berries, and nearly as good as Delaware.

THE SOLOMON GRAPE.

Mr. Carpenter introduced specimens of the Solomon grape, a new variety, which ripens as early as the Hartford prolific, and is as good as the Isabella.

Mr. Lawton stated that he had lately tasted a new grape, called the Raabe grape, which resembles the Delaware, and is still more delicious than that excellent grape.

Mr. Lawton also showed a specimen of the golden Chasselas, grown by Mrs. Wells in the open air. Mr. L. stated that this and several other sorts not deemed hardy may be grown in city lots in great abundance.

Mr. Pardee stated that the Delaware does not come to perfection until the third year. It is a little feeble the first two years of its fruiting.

Dr. Trimble.—At one time I ripened the golden Chasselas at Newark to perfection upon young vines, but as it grew old it failed almost entirely.

Dr. Trimble presented a girdled grape vine, showing an enlargement above, at the expense of the portion of the vine below the girdled part—the part above being two or three times the size of the part below. He presented fruit from the girdled portion. and from other portions of the vine; the fruit on the girdled portion being ripe and four times the size of the other specimens, which were just turning in color. This girdling process, he said, was at the expense of that portion of the vine above the girdled part, causing its death after the present season. The fruit is much enlarged, and ripens three or four weeks earlier. The girdling should be done when the fruit is the size of a pea. It must be watched, to prevent its growing over during the season. This process can be used to advantage on very vigorous grape vines, where they are growing beyond what is wanted. It has the effect

of prolonging the season of fruit. The explanation of its power is, that while the sap passes from the roots through the wood, the sap elaborated in the leaves cannot pass to the root, but is all retained to the fruit above the girdled portion.

Mr. Carpenter presented some fine specimens of Proctor, Jersey sweeting, and Alexander apples, and also some beautiful species of flowers.

Judge Meigs read a letter from Illinois, stating that an insect, resembling the locust borer, was beginning to attack the locust trees in that region. Dr. Trimble thought that it was the same insect that has been so injurious to the locust trees in this part of the country for so many years.

Mr. Dickinson said that a tree could be preserved from the attacks of insects by placing a quantity of common soft soap in the crotch, which, whenever it rained, would wash down and thus cover the body. The soap need be put on only every spring, and the tree might be washed in the fall with ley, to prevent its forming a coating.

LONG ISLAND WHEAT.

The Secretary presented a specimen of wheat grown by Valentine Frost, of Glen Cove, L. I., whose family have occupied the same farm for two hundred years. This sample proves that Long Island is still capable of producing first rate wheat, thirty bushels per acre.

AN ORNAMENTAL EGG-PLANT, &c.

Wm. S. Carpenter showed the new Chinese scarlet egg-plant, which is a very ornamental one in the garden. The white egg-plant is ornamental, and also very good for cooking.

THE JERSEY SWEETING APPLE.

Mr. Carpenter thinks this one of the best sweet apples ever grown. Mr. C. also showed a variety of other apples in season. The Belleflower he finds to sell equal to any variety in this market this season. He also showed a great variety of flowers.

Adjourned.

October 8, 1860.

Present, 44 members. Mr. Wm. Lawton, of New Rochelle, in the chair.

Mr. Secretary Meigs gave notice to the society that the British International exhibition would be held in London in 1862, under

the auspices of the London Society of Arts, of which Prince Albert was president. £350,000 sterling had been raised for that exhibition. He hoped some ingenious American citizen might invent a practicable tillage machine, to be presented at the International exhibition, which would rapidly pulverise the soil, and put it in proper condition for planting. There was now no machine in existence capable of performing this labor, but he trusted one would be brought out at the exhibition, already alluded to, which would reflect credit upon American genius and American industry. The secretary made some further remarks relative to the general absence of the curculio and other destructive insects during the present year.

Mr. Carpenter, of Harrison, N. Y., also spoke with reference to the ravages of the curculio, which had heretofore proved so destructive to the plum, but which had almost entirely ceased the present year. For those who still found themselves annoyed by this insect he would offer a remedy tried by a friend of his, and said to be effectual. His friend had a plum orchard containing two hundred trees. The curculio destroyed the major part of his plums. His plan to stop their ravages was to inclose his orchard with a board fence seven feet high. This he whitewashed on the inside. He then coated the ground with a mixture of salt and lime, and has hever since found a plum hurt by the insect. Mr. C. gave a rule as regards apples, particularly Newtown pippins, that they should never be picked as long as the leaves remained green. It was a peculiarity of all winter apples that they continued to increase in size while the leaves remained green.

Mr. Doughty, of New Jersey, said that he had seen as much of the insect this year as formerly, though he had gathered more plums, owing to the increased crop. He was glad to know of a remedy. Rosebugs had not troubled him this year, though a few years since he had had quantities of them on his shrubbery. He attributed their absence to the use of whale oil soap, with which he had syringed the plants affected.

Mr. Weaver, of Porter, said the bugs had literally eaten up all the grapes he had raised during the year, and thought, in his locality at least, the ravages of the bugs were fully as extended as usual.

Solon Robinson asked for information relative to the potato disease, giving some of his own ideas on the subject. The best variety of potato to withstand the disease, he thought, was the

Davis seedling, a Massachusetts potato. It was remarkably free from rot; was a very solid potato, and very white, mealy, and dry when boiled.

Mr. Carpenter said the rot was spreading in his section (Harrison) and in other places, particularly among the peach-blow potato. One farmer on Long Island has already lost 400 barrels of this variety by the disease. He concurred with Mr. Robinson that the Davis seedling was the very best potato now cultivated, some specimens of which he would offer. The yield, he said, was about 300 bushels to the acre. With the above, Mr. Carpenter presented a variety known as the Prince Albert, which he considered next to the Davis seedling. He also displayed four varieties of field corn, large size and very handsome. The first of these was the "Improved King Philip," having a fine brown-colored kernel, long ear, and large grain. It would yield from 90 to 100 bushels of shelled corn to the acre, and ripen in one hundred days. It was double the size of the ordinary King Philip, and had been under cultivation six years.

The second variety was the "Golden Drop." This was an eight-row corn, very large grain, and very small cob, was a good corn for yield, and would ripen in one hundred and fifteen days.

The third variety was the T corn, originated in the South, but which was found hardy at the North. It had a rather small grain, but was a very heavy bearer.

The fourth variety was produced by a cross of the T corn and the crystal flint, and was a very excellent variety, being very handsome, and capable of ripening in one hundred and fifteen days.

Mr. Carpenter stated it as a curious fact, that the "Improved King Philip" corn would not mix with any other variety. In this assertion he was sustained by Mr. Robinson. This latter gentleman said he had planted it in a field, where sweet corn was upon one side, yellow corn upon another, and pop corn only a little distance off, and that it did not mix.

Dr. Trimble said he could hardly credit such statements, and recommended to the society to test the matter thoroughly.

The discussion on grapes was next opened. Dr. Trimble remarked that he had never known Isabellas so fine as they were this year with him.

Mr. Robinson rejoined that he had never known them so poor. Several gentlemen corroborated the latter statement.

Mr. Carpenter said the Isabellas were never so good with him as the present year.

Mr. Fuller thought the Isabellas as good this year as ever, but that they were "nowhere" in comparison with the Diana, the Catawba, the Delaware, and other varieties.

The chairman could not agree with Mr. Fuller. It might be that in age, one remembered and loved the things of their youth better than those of the present, but he must certainly say the Isabella was his favorite grape.

In reply to a question, Mr. Fuller spoke of the Diana grape as being a great bearer.

The regular questions of the day were then read. The one on fruit and fruit-houses, offered by Mr. Carpenter, was taken up and discussed at length. Mr. C. said he was not fully prepared to submit a plan for a fruit-house, but would do so at the next meeting. In reference to packing fruit he thought wheat or rye bran the very best article in which to pack for transportation. For the preservation of fruit he thought a room constructed above ground would be found the most effective.

Mr. Pardee had no confidence in any kind of material for packing or preserving fruit. The French plan for a fruit room he thought the best. This was to select a spot on the right kind of soil (porous and well drained,) and upon this to erect a house twenty feet square. The walls being of mud or clay, and one foot thick; outside of this wall and one foot from it another should be constructed, eighteen inches thick, also of mud, the roof being of the same material; the doors so to be placed as not to be directly opposite each other, and the ventilation to be effected through a small aperture in the upper corner of the inner roof. A room like this could be kept at an even temperature, and by this plan he had known fruit to be preserved for many months.

Mr. Carpenter, being called upon, named five varieties of apples as being best adapted to winter use, as follows: Rhode Island Greening, Baldwin, Monmouth Pippin, Smith's Cider, and the English Russet. He also, by request, named some varieties of winter pears, among which he considered the Lewis and McLoughlin varieties as the most desirable.

Mr. Fuller thought the "Lawrence" the best variety of winter pear now under cultivation in America. He would also suggest the "Vicar of Wakefield," which was a fine grower and a great producer.

The question for deliberation of the meeting next Monday will be the same as to-day: "Fruits—how to grow and preserve them." Adjourned.

HENRY MEIGS, *Secretary.*

October 15, 1860.

Present—Forty-three members. Mr. Adrian Bergen, of Long Island, in the chair.

FOREST TREES FROM SEED.

Dr. Peck, of Brooklyn, showed specimens of hickory and chestnut trees about a foot high, which grew from seed purchased upon a street stand in November last, which he buried about one inch under the surface, and left them there until April first, when they were planted, covered an inch deep, and every seed appeared to grow. The chestnuts were in that condition known as sweet—that is, somewhat shrunken. He earnestly recommends all who desire such trees to plant the seed now, this present month.

THE LANDS OF LONG ISLAND.

Dr. Peck gave an interesting account of the "barrens" of Long Island, and showed by a mass of of evidence that in all cases where these lands have been reclaimed they become very productive. The price of these lands has risen from $1 an acre, the price before the railroad was built, to $15 to $40 an acre. Still, there are large tracts uncultivated, and there is still the same ancient prejudice against these vacant lands that has ever existed among the inhabitants, and kept such a tract as that of Hempstead Plains a barren waste for two hundred years. Many peach, apple and pear orchards have been planted, and are very productive. Grapes, too, are doing finely; so are plums. Dr. Peck considers this region one of the most perfect natural garden soils anywhere in the vicinity of this city. The soil of Hempstead Plains is dark, like that of the western prairies. The soil of the oak barrens is a fine yellow, clayey loam, and has an abundance of potash, but is deficient in phosphates. The season on Long Island is longer than anywhere else near the city. No frost all this fall has been hard enough to kill tender vegetables. It is estimated to average ten deg. lower in winter, and ten deg. higher in summer.

William S. Carpenter—There are many persons now anxious

to buy lands near the city. They should go and look at these cheap Long Island lands.

Dr. Peck, in answer to the question; said that the lands were not worn out lands, for they never had been cultivated. Still, many people in this city suppose that the whole Island has been all occupied, and the part called barren made so by bad cultivation. It has been impoverished, perhaps, by repeatedly clearing off all the timber. This has been the case upon hundreds of thousands of acres upon Long Island.

Dr. Trimble, Monmouth county, N. J., had a few years ago an abundance of barren land. Now look at it, the most fertile and valuable. Ocean county, too, was considered as worthless as any part of Long Island. That, too, is being redeemed. A good deal of land in Burlington county has also been reclaimed, that has been done by the use of marl. There is still an abundance of cheap land to be had in New Jersey. Much of it within a few years has been occupied by Germans, who are growing rich by its cultivation.

Dr. Peck—There are no finer trout streams in the country than there are in these "barrens" of Long Island. This proves that the water is pure and healthy. When cleared of the timber, the land comes spontaneously into white clover.

Mr. Carpenter thought that all the neglected land near this city is not upon Long Island, or in New Jersey. There is an abundance of land within a few miles of the City Hall, in Westchester county, entirely unproductive and unprofitable.

Andrew S. Fuller—There are this day cheaper lands, considering location, within a few hours of New York, than in any part of the United States. It is generally supposed that this cannot be, because the lands are so near the city. But we have some heathens in this city, and still we send missionaries abroad to find them. Those who send them, perhaps, don't know that there are about as great heathens near home as anywhere on earth.

FORTY KINDS OF APPLES

Were shown by Mr. Carpenter from his farm in Westchester county. Also some fine specimens of Diana and Rebecca grapes from Chas. Downing. Mr. Carpenter stated that Mr. Downing thinks the Diana next in quality to the Rebecca.

WHEAT IN ILLINOIS.

Mr. Carpenter read a letter from Mr. Woodburn, Sterling, Ill., who estimates the yield of wheat at over 20 bushels per acre.

POTATO ROT.

Mr. Carpenter stated that potatoes are rotting to some extent in Westchester county—principally confined to the Mercer and Peach Blow variety, and to those which have been stowed in the cellar.

CORN STALKS.

Mr. Carpenter urged farmers to secure their cornstalks for fodder, particularly where hay is deficient. He thinks well cured stalks, cut from the ground, are worth $10 a ton in Westchester county, where hay is worth $15 or $20 a ton. The stalks will average about two tons per acre upon a good corn crop.

Mr. Vreeder of Albany.—I advocate cutting up from the ground, and doing it as soon as the corn is glazed. The stalks are estimated equal to two tons of good hay per acre. I have heard it stated that stalks of sowed corn, for fodder, will keep well if cut and bound up green, and left out until wanted to feed. I have heard the plan advocated of storing hay in barns that are very tight, without ventilation. Corn stalks that have been sweated in shocks may be stored quite damp, and yet keep well. I have put green grass into a barn where I had plenty of room, and it cured well. I never spread clover or other grass to cure it, but cock it right up in small cocks, which lay over night, when the cocks are opened and dried a few hours, and then hauled in the barn, and it keeps well.

The Chairman.—By using half a peck of salt to a ton I am able to store hay very green, and it keeps well, and cattle eat it well, and it sells well.

POTATOES.

Mr. Carpenter.—I tried last year 60 sorts of potatoes, and out of them have selected the following five for my own cultivation:

Davis Seedling, a red potato, very white inside, I name as No. 1. It is an abundant yielder, and is one of the most valuable potatoes in cultivation. The Davis is slightly oblong—the seed end deeply indented. The other eyes are not deeply set.

The Dykeman is a handsome white potato with pink eyes, roundish in form, and white flesh. It is about the best early potato I know of. It ripens quite early and yields fairly, and is good all the year.

The Prince Albert is a good yielder. It is long and white, is an excellent potato, and a great favorite in market.

The Dover potato is a very choice variety, red skin and white flesh; very good quality and yields well.

I have another seedling that I vouch as fifth, the name not recollected, and these five I have selected out of all the sorts which I have experimented with.

The Peach blow is a good potato, but has some serious faults. The Buckeye is a good potato, particularly early. The Mercer rots so that we have given up its culture.

Mr. Veeder.—In Albany county, the Mercer potato is grown upon very sandy land, without rotting; while upon clayey soil it has rotted this year very badly. It is preferred to plant potatoes upon clover sod. We use a good deal of plaster on the clover, but no manure for the potato crop.

Andrew S. Fuller.—In the vicinity of St. Louis, I have never seen potatoes of first-rate quality, though growing of large size. The soil there is heavy and mucky, and the potatoes coarse. Hence potatoes are brought from the light lands up the river, and are so much better that they sell for four or five times as much as those grown near by that city. It is my opinion that potatoes are always better when grown in sandy soil than in clayey or mucky soil. The potatoes grown for this market on Long Island, and in the sandy lands of New Jersey, are superior to those grown upon heavy lands in any other section.

FRUIT HOUSES.

Mr. Carpenter asked that the subject of fruit houses, and the best mode of preserving fruit for winter use, should be made a question for the meeting next Monday.

Mr. Roberts asked to add fall planting of trees, both fruit and forest, and also the best mode of cutting and preserving grafts.

KYANIZING FENCE POSTS.

Solon Robinson.—I have a letter of inquiry from R. Dixie, Painsville, Ohio, about kyanizing posts. He says that in some of the reports of procedings of this club, one person recommends copperas and another, blue vitriol, and he wants to know which it should be, since copperas retails for six cents a pound, and the other at six times that.

I answer, that originally all similar substances to copperas were called vitriol instead of their proper names of sulphates, distinguishing them by colors. As "green vitriol" (copperas) is the sulphate of iron, "blue vitriol" sulphate of copper, &c.,

and these substances are still spoken of as vitriol. As to which is best I cannot say, probably "white vitriol," which is the sulphate of zinc, would be best, but in my opinion the sulphate of iron (copperas), which is a very low-priced substance, will answer all purposes. And a still cheaper substance is also recommended, after having been thoroughly tested in England, and that is Creosote. It is found preferable to sulphates of zinc or iron, or chlorides of zinc or mercury. The report says:

"On the Buckinghamshire railway about ninety thousand sleepers that have been treated by the above-named three processes, and about thirty thousand prepared with creosote were laid down, and it was found that the latter were far more durable than the others. Timber which had absorbed about eight pounds of liquid creosote to the cubic foot was apparently as sound at the end of five years as when first treated. It has also been stated that this peculiar substance not only prevents the decay of timber that has been treated when in a sound condition, but it also arrests decay after it has commenced in timber. This is a most valuable condition, and its reliability has been tested on quite a large scale on the Great Northern and the Lancashire and Yorkshire railroads (England), on which roads creosoted timbers that have been down for ten years appear to be as good as when first laid. Creosote is a product of the distillation of wood in retorts, and it receives its name from its well known power to preserve animal substances by coagulating the albumen. It is a liquid which may be made from the refuse or useless parts of the very trees that are chosen to make railroad timbers. It can be kept in wooden tanks into which the timbers may be placed and sunk by weights so as to steep them for several days under the liquor. Creosote has a pungent odor, but this is not very objectionable; it is the same as that which flavors smoked ham, and to many persons it is far from being disagreeable. All timbers for bridges, the sills of buildings, and the sleepers of railroad tracks should be treated with this substance, or some other equally as good, if there is any. The refuse creosotic compounds of coal oil—those which are obtained from distilled coal as well as from the natural oil wells—may be as powerfully antiseptic in their nature as creosote distilled from wood. Experiments should be made to determine this, because such products are now thrown away as waste, whereas they may be usefully applied to render exposed timber ten times more enduring

than it now is, and thus save millions of dollars to our country annually."

The hour of one having arrived, the regular subject of the meeting—"Barns struck by lightning, and the prevention"—was taken up.

Judge Meigs said, as far as his experience extended, an immense number of dwellings escaped the shock of being struck, while a great number of barns suffer.

Dr. Trimble said he had noticed, in the agricultural portion of the Patent Office reports for 1859, a paper from Prof. Henry on this subject, which seemed to cover the whole matter. He mentioned it to the club for their consideration.

Mr. Lyon related an instance of striking by lightning, where it was proved, in the most conclusive manner possible, that the lightning rod directed the electricity and prevented damage. He knew numbers of other instances in which the evidence was clear as in this of the utility of lightning rods. He believed that the laws which govern electricity were as simple, definite, reliable, and intelligible as the laws which govern a car on a railroad track, and he would feel no more uncertainty about the direction that it would take on a building properly supplied with rods than he would of the direction that a car would take on a railroad track.

Mr. Solon Robinson, who scouts the idea of lightning rods being of any use in the prevention of damage by electricity, said he was lately traveling by a lightning rod manufactory, and he looked in vain, on any part of the building, for a lightning conductor. They made rods for a living, and trusted to providence for safety.

Mr. Robinson read some interesting extracts from a book on the subject.

Prof. Renwick doubted whether there was an instance of a barn being destroyed by lightning when protected by lightning rods properly constructed.

Prof. Mapes mentioned the various theories in reference to this matter, and said that he could hardly decide which was the true one. Seeing Mr. Quimby present, he would like to hear from him upon the subject.

Mr. Quimby said: The idea on the part of those who have not thoroughly examined all the facts in the case, that lightning rods are of little or no utility, was, it must be conceded, a very

natural one, when it is considered that so many casualties from lightning have occurred despite the presence of certain kinds of lightning rods. These rods have been, in many instances, highly recommended by scientific men, or, at least, have purported to be; and, when they failed, the idea at once arose that, inasmuch as these rods, alleged to be of the latest improvements, had proved useless, therefore no confidence could be had in any rods. A safer opinion, and one which he thought to be fully established by the data in his possession, was that the effecting of protection from lightning eminently demands the exercise of the soundest discretion and judgment, based upon thorough scientific knowledge and experience, not only in the matter of the mechanical construction of the rod itself, but in the manner of its arrangement upon or adaption to the building. Buildings are differently situated and exposed as regards lightning; therefore, the person who attempts to protect them, should have the requisite ability to enable him to detect and consider the nature and extent of exposure, together with a knowledge of the proper means to apply to provide for the peculiar exigencies of the case. If he is deficient in these particulars, he is liable to error, and the result of his mistake may be the destruction of the building by lightning, which has heretofore not unfrequently occurred. The mere fact that an ignorant person has failed to accomplish what might be called a scientific result, was scarcely sufficient to condemn all efforts in the same direction, and as an evidence of the utility of lightning rods, it was to be observed that during the last twenty-five years or so, A. M. Quimby & Son had directed the application of lightning rods to many buildings in various parts of this and neighboring countries with uniformly successful results, that is, so far as is known; not a single instance had occurred, he said, where these rods have failed to afford the desired protection to the buildings on which they have been placed. This fact, of course, was very important, and would seem to cover the whole ground, but as there had been strenuously asserted differences of opinion as to the construction of the rod, it was desirable to consider the subject in its theoretical aspects. They had always believed the practice of insulation to be radically unscientific and wrong, and had therefore never adopted it; yet as was just observed, their rods had always proved perfect safeguards from lightning, while various kinds of insulated rods had, in many cases, proved utterly useless.

The objection to insulation was, that it permits an excessive electrical disturbance within the building under the influence of a thunder cloud, until, at the instant of the discharge, the equilibrium of the building itself can only be restored by an explosion between the rod and the house. It was immaterial whether the discharge be from the cloud to the earth, or from the earth to the cloud; the insulators in both cases equally interfered with the true office of the rod, which is, or should be, to neutralize any electrical disturbance within the building, by gradually taking off any excess, or supplying a deficiency as may be required. The electrical activity refered to, was induced solely by the cloud, and the passage into the building from the earth, of currents of electricity in a rarified state, which flow silently without producing any mechanical effects. The insulation prevents these rarified currents from flowing off freely, by means of the rod, to the atmosphere, and retains the fluid within the building, until there is a sufficient quantity to overcome the barrier presented by the insulators, and it bursts out with an explosion. He had seen this in many cases, one of which occurred to him where more than half of the insulators were broken by the discharge, and where, if the rod had not been insulated, he believed no harm would have been done. Insulators prevent the rod from acting efficiently as a distributer of electricity. A discharge of lightning is the passage of an excess of electricity from one body to another body, or mass of matter which is deficient; when the discharge reaches the negative body, it divides and subdivides, until it is equally diffused through it. In the case of a discharge of lightning from the cloud, received upon an insulated lightning rod, there is no provision for the communication to the building itself of the quantum of electricity which, in common with all other matter in the neighborhood, it requires to restore it to its natural state of equilibrium, and that quantity must therefore leave the rod and enter the building with an explosion. By the exercise of skill and judgment, the rod can be so connected with the building, and so arranged as to distribute the fluid to the building in such minute portions as to do no harm.

[In answer to an inquiry here, Mr. Quimby said that he used rods three-eighths of an inch square. The manner of putting up the rods was decided by the position, size and requirements of the building.]

Mr. Dickinson inquired if the attraction of a lightning rod,

properly constructed, was equal to the gases rising from moist hay, as it was put up in barns in the country, and which was the cause of their frequent destruction.

Mr. Quimby thought that a rod properly put up was sufficient to ensure the safety of the barn in this case, and his experience abundantly confirmed him in this belief. To an inquiry as to how he would put up a rod on a barn thirty feet square, Mr. Quimby said it would depend some on the nature of the soil—as to whether it was very dry or moist. If the ground was tolerably moist, it would be advisable to have rods at, at least, three corners of the building. to be connected by rods lying on the roof. He said he very nearly concurred with Prof. Henry, with the exception of the necessity of continuity of metal in the rod. The firm of which he was a member had found by experience that a mere contact, by screws or otherwise, was sufficient. The practice of insulation had arisen from a misconception of conditions incident to a discharge of lightning. All the glass in the world could not alter these conditions. The building has to receive or give off, as the case may be, a certain quantity of electricity; the question was, how shall the equilibrium be restored? by an explosion of electricity accumulated in sufficient force to overcome the insulation, or by means of the intimate connection of the rod with all parts of the building whereby a rapid distribution is effected, and the fluid in its rapid state can circulate freely and silently in all directions.

Mr. Lyon argued in opposition to some of the ideas advanced by Mr. Quimby. He said if a building could have a perfect conducting power in all its parts, damage from lightning would be unknown. Among the many magazines of Europe, which are built of iron, there has never been an instance of their being struck by lightning. A man encased in armor is perfectly safe in a thunderstorm. He considered that there was one kind of electricity in the clouds, and another kind in the earth, when these two forces come together there was a concussion. The object of a conductor was to bring these forces together easily and without concussion. If our houses were covered with metal there would be no danger from lightning. His opinion was therefore in favor of insulators.

Mr. Quimby said that his firm had the experience of twenty-five years of entire success to confirm them in the disuse of insulators; and their rods had insured safety, while many buildings

were destroyed every season where insulated rods were used. He also offered arguments in favor of his position.

Some very interesting opinions on the subject were being advanced by Prof. Nash, when the discussion was interrupted by the announcement that it was two o'clock, at which hour the club adjourns. The subject was, however, continued until the meeting on next Monday.

HENRY MEIGS, *Secretary.*

October 22, 1860.

Present, 56 members. Mr. Wm. Lawton in the chair.

During the hour allotted to miscellaneous matters, the following subjects were introduced:

"THE RAG APPLE."

Solon Robinson.—I have a letter foom A. S. Avery, Morris, Otsego, County, N. Y., giving the history of a very excellent sweet apple, which he supposes peculiar to that locality, called the "rag apple," from the circumstance of a rag grown into the original tree. He says:

The tree is a remarkaby thrifty grower and bearer. The sample I send you is picked up promiscuously from a pile, and not sorted for the occasion. They will be in their prime next month, and will keep good till April. The cores are not large, and the skin thin as an onion. When fully ripe they are quite mellow and juicy, and the people in this vicinity frequently slice them up and eat them with cream and sugar, the same as peaches. I have no trees to sell, but any person having friends in this section of the country, can readily obtain a few scions.

I received the box alluded to before I did the letter, and not knowing what the apples were sent for, and having an abundance and to spare at home, I distributed them in *The Tribune* office, where they were eaten with satisfaction. I took two or three home for comparison, and find that I have three trees which, if not identical with the rag apple tree, produce fruits so near like that apple that I can't tell the difference. I have brought a sample of mine, for which I have no name, and I esteem it one of the best apples for baking that I ever saw, and it is very pleasant to eat out of hand. It has been in daily use in my house for two months, and the apples look as though they would keep well another month. It has a thin, white, wax-polished skin, with a

light yellow blush, flecked with small red spots, is of medium size, reverse pear shaped, the calix in a deep cup, stem short and set in a deep cup, the flesh juicy and rich. I consider it a valuable apple, and shall be glad to furnish members of the club with scions for grafting.

Several members tested this, and considered it a very rich apple.

R. G. Pardee.—This is almost identical with a sort in Western New York, somtimes sold as the Talman Sweeting, and never objected to by purchasers when they find that it is not the Talman, as it is really superior. I find this has the same peculiar flavor. The only objection is its size.

THE POTATO DISEASE.

Solon Robinson.—This disease has made its appearance this year in a very modified form. May we hope that the day of its great ravages have gone by! I hear of it here and there in Westchester county, slightly affecting some of the varieties. With me, the peach-blows, after having been dug some time, have rotted a little; but worst of all, four varieties of new seedling potatoes, which I mentioned at one of the meetings of the club last spring as having been sent to me for trial. One of the white sorts nearly all rotted before they were dug. A dark-colored variety, and a long kind, like the Prince Albert, have not rotted, but they are not valuable for cooking at present; possibly they may improve before spring. The very best variety that I have ever cultivated is the Davis seedling. It is a light red potato, roundish form, medium size, and the tubers are very dense, weighing more to the bushel than any other sort I know of. The only complaint I ever heard about them in my family is that they won't hold together to cook. This is true in some measure; for if peeled before boiling, the outside often flakes off before the center is sufficiently cooked, and when the potatoes come to the table they have to be handled with a spoon. The flesh cooks very white, and is excellent to the taste. There is a little prejudice against this variety on account of the color of the skin. Some people have a prejudice against all dark-colored skins.

Wm. S. Carpenter.—The peach-blows and Mercers, in the east part of Westchester county, have rotted very badly. I hear of one man on Long Island that lost 400 barrels. Mr. Carpenter

exhibited specimens of Davis seedling which yielded 300 bushels per acre. These were tried, and proved extremely dense. Mr. Carpenter corroborated all and more than Mr. Robinson had said about the quality. It originated in Massachusetts. The Prince Albert was free of rot with him this year, and yielded very finely.

Several members spoke about colored potatoes, and to the prejudice against them.

Dr. Trimble.—The blue pink-eye potato, which once grew well in this State, was a most excellent potato, but was badly affected by disease, and it has perhaps gone out of use.

Mr. Carpenter.—The black Carter has a very black skin and white flesh. It rotted badly, and I gave it up. The black Mercer is a good potato, but that also rots.

THE FONTENAY RASPBERRY.

Mr. Carpenter exhibited branches of this berry in full bearing, of the third crop. Its first is very early, and the berries large. I prefer it to the Cattawissa, as it is very hardy.

INDIAN CORN.

Mr. C. showed specimens of the improved King Philip corn, which he esteems the best variety grown in this section. It is a brown corn, large ears, and ripens fully in 100 days.

The Golden Drop, a yellow, eight rowed corn, is also a good sort; it ripens in about 115 days.

The Tea Corn is a long eared, white variety, from the South. Another white variety, made by a cross of the Tea upon the Devereux, is an improvement upon the Tea. This cross is a sound flint corn, long white ears, and productive—the ears 12-rowed, cob small, taking 115 to 120 days to ripen.

The Dutton corn requires 100 days to ripen, and it does not produce over three-fourths as much as the improved King Philip. It is estimated that it will produce 90 bushels per acre. And one peculiarity is that it will not mix with, or rather allow other sorts to mix with it.

Solon Robinson corroborated this fact, by stating that he planted the improved King Philip, intimately mixed with other sorts, none of which mixed with it.

Other members thought this an important fact in its favor, and tried to elucidate the reason why, but found no tenable theory.

TIME OF PICKING WINTER APPLES.

Wm. S. Carpenter.—Winter apples never should be picked as long as the leaves remain green. This year the late picked apples, particularly Newtown pippins, are about one-fourth larger than those picked early.

INSECTS THIS YEAR.

Several members expressed the opinion that there has been a very much less number of insects this year than formerly—particularly curculio and rose bugs, Grapes have been heretofore destroyed by rose bugs to a great extent.

ISABELLA GRAPES.

Dr. Trimble asked the opinion of members about the Isabella grapes this year. He thought them better this year than ever before.

Solon Robinson, R. G. Pardee, Andrew S. Fuller, and others, asserted that they had never known the Isabella poorer than this year. Mr. Fuller, however, thought that part of the objection to the Isabella this year, is because we have acquired a taste for other better sorts. No one who has eaten the Catawba and Delaware in perfection can relish the Isabella.

Mr. Carpenter said that the Isabella had ripened with him this year for the first time.

The Chairman thought the Isabella very valuable because it could be grown where others could not. He also advocated the Northern Muscadine.

Mr. Fuller contended that the Northern Muscadine is almost worthless. He spoke highly of the Diana, the Concord, and Delaware, as far superior, and as easily grown as the Isabella, Muscadine, and other almost worthless sorts.

FRUIT HOUSES.

The question of fruit houses was now called up, and Mr. Carpenter said that the same principle adopted for ice houses was the right one for fruit houses, so as to preserve an even temperature. The best thing to pack fruit in for transportation is wheat bran. It is better than charcoal. Fruit rooms have been constructed in ice houses, by which fruit has been kept a long time, but the quality of some sorts are injured by this mode of keeping,

Mr. Fuller said that Columella recommended cut chaff about 1,800 years ago.

R. G. Pardee.—The French method of preserving fruit is to

build a fruit house, upon a porous soil, of unburnt brick or clay, the walls a foot thick, and roof the same. Outside of this first building another one is built, so as to inclose the first room with a column of air 14 inches thick. The doors must be fitted very closely, and seldom opened. The fruit is laid upon shelves. Grapes can be kept packed in cotton or soft paper.

Mr. Fuller.—Columella recommends suspending the bunches by the small end in earthen jars, and filling up with oat chaff.

The Secretary.—Any condition that will keep vegetable or animal substance in the exact same temperature will preserve it any length of time.

Mr. Carpenter.—Some of my neighbors find picking apples when perfectly dry, and heading them up at once, and storing them in cellars at once, a good plan. Others think it best to let the barrels lie under the trees until very cold weather. The worst plan is to pick apples and barrel them, and let them lay. I would prefer to put them immediately in the cellar. I have found piling apples on straw, in heaps, covered from the sun, some days or weeks before barreling, a good way. So I have to pile the apples on the barn floor. The best five varieties with me for winter apples, are: Rhode Island Greening, Baldwin, Monmouth Pippin, Smith's Cider, and English Russet.

The Chairman.—It is a great object to get a select variety of fruits, not to embrace too large a number of sorts. I hope we shall soon get a report from the committee appointed sometime ago to make up such a list.

Dr. Trimble replied that the committee would meet next Monday.

PEARS.

A discussion ensued about winter pears. Mr. Fuller thought the Lawrence the best winter pear in America. The Beurre Diel, is a large fine pear, but it ripens before New Year's, and that is too early for a true winter pear. The Vicar of Wakefield, if picked dry and kept in a good fruit room until it turns yellow, and then is finished in a warm room for about ten days, it is an excellent pear. The tree is very productive, and the fruit could be kept till February.

Mr. Carpenter.—I picked last year from one tree, only seven years old, a barrel full, and I kept them till April, but they were only fit for cooking. I do not esteem this variety.

Mr. Fuller stated that he had found them so good that he had sold them in this city to dealers at 25 cents a piece. The Glout

Morceau is a good pear, when it can be had in perfection, but that is very seldom. The tree is a miserable bearer. The Lawrence pear originated near Flushing, and certainly, for this locality, has no equal for winter; if well kept and finely ripened. I hope this subject of fruit, how to grow it, and how to keep it, will be continued next week—it is a very important question. I have known some of the very best winter pears wasted, because those who grew them did not know how to keep and ripen them. In fact, they did not know their value.

A CHANCE FOR AMERICAN INVENTORS.

H. Meigs, the Secretary, said that the World's Fair, London, 1862, is to be an important event.

The London Society of Arts with 350 affiliated societies, of which Prince Albert is President, has obtained a subscription of £350,000 sterling, to make the exhibition a perfect success. There is a great chance for American ingenuity.

We now request American inventors to give us these: The greatly wanted Tiller of the land, the real Pulveriser.

The heavy roller of steam plows *cannot* cross-plow.

Let us have a rapid digger, forker, or spader, which will do all that is wanted to make the earth mellow.

I believe we can do it. The boast will be forgiven if we succeed—and we surely *can*. At least let our inventors try.

We give this timely notice that our country may carry off the immense reward and world fame of mechanical thorough tillage, with a saving of time, corresponding with our harvest reapers, without which this year we could hardly have got our millions of breadstuff off our fields. In fact, the grain crop of 1860, could not have been saved without the American Reaper. Now let us have an American Steam Tiller—not a plow, but a machine to pulverize the soil, one or two feet deep.

Adjourned. HENRY MEIGS, *Secretary.*

October 29, 1860.

Present, 56 members. Rev. Joshua Weaver, of Westchester, in the chair.

The Secretary, Judge Meigs, read the following paper upon national progress:

AMERICAN PROGRESS—AMERICAN MACHINE HARVESTERS.

The immense breadth of land bearing grain in 1860, in our

country, is generally admitted to have been almost entirely reaped by machine reapers. One great scene, 100 machines were in action at one time.

We anticipate a near period in which new machines, now uninvented, will perform farm labor which will exceed in amount that of 100 men, and all the men will be indispensable to take care of the crops.

Some political economists have written against machines, as rendering human hands useless. Crowds of artisans have rebelled against machines doing their work But machines have no ears—they work away, and at last the crowd finds itself better off than ever before. The steam engine in Great Britain does the hand work of 400 millions of men, and yet multiply clothing and food more plentiful. The deaths and famine and nakedness of millions in past ages have fled. It is a question of power, and whether plowing the land or plowing the sea, whether digging the ground, the coal mine, or those of the gold, silver and copper, machinery is the only power.

Before the machine, the United States paid 25 to 30 cents for a yard of cotton sheeting, which, from its wretched character as hum-hum, would not sell now for three cents. Now an excellent, strong, fine shirting is made by millions of pieces, and retailed at six cents a yard, and enough is made here to shirt the human race.

Solon Robinson.—It is a fact that harvest hands are in much greater demand than they were before the harvesting machines were brought into the field. This will continue to be the case until some other inventors are induced by the demand to invent other machines far ahead of our present ones. We have sowing machines, reaping machines, threshing machines, winnowing machines, and yet the demand for labor increases.

RENOVATING PEACH TREES.

Mr. Doubleday said his remedy for peach grubs is boiling ley of wood ashes poured on the roots in the spring.

USE OF PLASTER.

Mr. D. also urged farmers to use more plaster in stables, and upon all putrescent manures.

MINNESOTA WHEAT.

Solon Robinson read the following letter from Washington city, from the Hon. W. C. Dodge, which is worthy of attention by all wheat-growing farmers. He says:

I take the liberty of sending you herewith, a specimen of Minnesota spring wheat which I have just received from there. Although possessing no unusual appearance, so far as the berry alone is concerned, it is certainly an extraordinary variety as to its yield.

From two bushels of this wheat, sown on 1¾ acres of land, there were produced, gathered, and threshed, 80 bushels of wheat, from which this sample was taken at random. This would make an average yield of 45 5-7 bushels per acre, which is the more remarkable from the small quantity of sown per acre—being only about half the usual quantity. It was grown by Messrs. Starr & Gaylord, of Lake City, Wabasha county, Minnesota, on prairie land, on which corn had been raised the previous season, and without manure of any kind. It was sown on the 2d day of April, and harvested July 15—all of which statements are verified by the affidavit of the two gentlemen referred to, and which I now have in my possession. The heads are represented as being unusually long, and as containing nearly double the usual number of kernels. The straw is said by them to be very stiff and strong. Its name is unknown to me, and appears to be by them also. If it does not belong to any known variety, I beg to suggest that you christen it the "Minnesota White." Where the seed came from I do not know; presume they could inform you.

Inasmuch as the people of Minnesota think injustice has been done them by *The Tribune* and other Eastern journals in questioning the productiveness of their soil, &c., I hope that you will place this on exhibition in some proper place, accompanied with a statement of the facts that those interested in wheat culture may know the facts. Aside from this I should suppose it would be worth while for your society to take some steps for the propagation and dissemination of this variety, as a valuable addition to our list of varieties already cultivated.

As a further sample of the yield of wheat in Minnesota, I will state that Mr. George Hendrickson, residing in Rose township, Ramsey county, near St. Pauls, sowed the following kinds with the results as appended:

Kind of wheat.	Number of acres. acres.	rods.	Total yield. bush.	Yield per acre. bush.
White wheat	5	33	156¼	31 1-5
Scotch club	4	47	187	46½
Rio Grande	17½		572¾	34
Canada club	7¾		281	28

Average yield of whole crop, 33 bushels per acre. Of barley, 11½ acres produced 500, average 45 bushels per acre. Of oats, 8¼ acres produced 450, average 56 bushels per acre.

Great pains were taken to make the measurements accurate, and the affidavits of Mr. H. and his men can be obtained if desired. The oats were not considered a large, though a fair yield.

Mr. Lawton moved that Wm. S. Carpenter take charge of the sample, and try it, and report results.

Mr. Carpenter.—The grains of this wheat appear remarkably large and plump for spring wheat, better than any other sort I have ever seen. Spring wheat is grown to a great extent in this State, in many sections where winter wheat will not produce a good crop.

Dr. Trimble.—My idea of spring wheat is that it is only sown as a substitute for winter wheat, where the latter has failed, by reason of the ravages of the Hessian fly, or because the winter grain was killed in winter. I have never understood that spring wheat was of as good quality as winter wheat. I hope this variety will prove a valuable sort, and that we shall be able by its means to extend the wheat culture in this vicinity. Dr. Trimble then spoke of the operations of the ichneumon insects that have destroyed the Hessian fly, and are now likely to destroy the wheat midge. He also illustrated how the ichneumon deposits its eggs in the bodies of other insects. Since insects have made such ravages upon the wheat crop in all the Eastern States, I hope that we may, out of this or some other sort, get a new sort of spring wheat which would be a great desideratum.

THE POTATO DISEASE.

Mr. Carpenter exhibited specimens of peach blow potatoes from Harrison township, Westchester County, badly affected by the potato disease—the dry rot—which first affects the skin, and works inward rapidly. The disease prevails to a large extent; some crops have been entirely destroyed.

Solon Robinson.—My own peach blow potatoes are all going to decay, some weeks after being dug and stored in the barn The Davis seedling and Prince Albert potatoes, grown right alongside, are all sound.

NEWTOWN PIPPINS.

Mr. Carpenter exhibited some fine specimens of Newtown pippins, beautifully blushed with red; the most so we have ever

seen. They were from the farms of Edward Willis and Stephen Barnes of Harrison township, Westchester county. These were considered remarkably fine specimens by the club. Mr. C. said he thought Mr. Barnes had 500 barrels of such. In all that part of the county, the apple crop is not only large, but the fruit is the finest grown in a great many years. Mr. C. also showed some fine specimens of winter pears some of which will keep till May.

THE VANDEVERE APPLE.

Wm. Lawton.—Here are some fine Vandevere apples from a tree that is over 100 years old, perhaps 150 years, which bore this year at least twenty bushels of apples. The tree is still very healthy and several feet in diameter. The branches have spread very wide and high. I have some Fall pippin trees forty feet high. And here is an excellent apple called the "Grandfather apple." I have here some Newtown pippins, also very much blushed. These are from trees 60 or 70 years old at least. These old trees have all been "digged about and dunged," for I cultivate the ground as a garden and for small fruits. The grandfather apple is an early and good fruit. The Vicar of Wakefield pear, which I hold in my hand, I can produce in great quantities, but I do not esteem it for anything but a cooking pear.

ISABELLA GRAPES.

The Chairman introduced specimens of Isabella grapes grown at Fordham, to vindicate the character of this variety. These were eaten, and pronounced excellent. They certainly were superior to any Isabella grapes we have tasted this year.

THE EXCESS OF FRUIT IN THIS MARKET.

Mr. Carpenter stated that the quantity of apples now coming into the city from Westchester County, is not less than 25,000 barrels a week. The pippins bring $1.75 a barrel, and common fall apples only $1 a barrel.

Dr. Trimble stated that he knew of farmers who had sent apples to market which did not pay expenses. I tasted very large, fine Seckel pears from Norfolk, about six weeks ago. Now we have them in profusion from Central New York. This makes a long season for this excellent variety. The fault with this kind of pears is that they grow so small. Perhaps by high cultivation we may get them, as a general thing, as large as those from Norfolk or those from Aurora.

FRUIT HOUSES.

Mr. Carpenter read a letter from Col. Wilder in relation to fruit houses and how to preserve the tender sorts, by the use of ice. He had kept strawberries in his over a month.

Solon Robinson.—The plan is the same as that in use in this city by many butchers for the preservation of meat. The ice is placed about the room used, so as to create a temperature even and dry, at about 40° Fahrenheit.

PEARS AND POULTRY.

Solon Robinson.—There appears to be a connection between pears and poultry, which is worth enquiring about. Messrs. B. & S. Beatty of Aurora, New York, have a very large poultry establishment—they fatten and prepare tons of poultry for market every year. Of course they have a good deal of the very best manure—the feathers forming no mean portion of it. They grow, probably in consequence of using this manure, as fine pears as ever need be eaten. Here is a sample out of a box they sent me of the poorest I could select. The richness of them is the most remarkable thing, though some of the Seckels were of great size. Of these they say:

"The Seckels are a fair sample of many grown on two trees, standing near a stone ash house, and consequently get plenty of *alkalies*. They are also dug around and manured. They grow on standard trees."

Does the keeping of large numbers of fowls have a tendency to lessen the ravages of the curculio? That is a question worth thinking about.

Dr. Trimble.—I can confirm this statement about superior fruit from Western New York. I had some pears the other day from Yates county, and I never saw such Seckel pears before. The Seckels were as fine as this.

Mr. Carpenter.—A person who grows pears some distance from this city had a quantity of Louis Bon de Jersey, which is only a second-rate pear, and he put them up in such a neat manner, one dozen in a box, which sold at $5 to $7 a hundred. This shows how important it is to know how to put up fruit for market.

QUESTIONS FOR THE NEXT MEETING.

Cattle, fall fruits, and flowers were the questions adopted for discussion at the next meeting. Mr. Carpenter hoped that the subject of milch cows would be particularly attended to.

Adjourned. HENRY MEIGS, *Secretary*.

November 5, 1860.

Present, 40 members. Mr. Adrian Bergen, of Long Island, in the chair.

LARGE AND SMALL FARMS.

Judge Meigs made the following statements in relation to large and small farmers:

Our country can at present have large farmers, and will until population much increases. Machinery is to this class indispensable; yet there are 100 small farmers to one large one, even now. The father has a great farm, the sons must have smaller ones; and while the good father still cultivates his 500 or 1,000 acres with his machinery, the son finds it necessary to begin small, use a pair of oxen, mules or horses for many years. Let us consider, for a moment, the value of this: The ox is the worker; he plows and harrows, hauls loads in heavy land, while mules and horses do light work. Now for the real of all this, to say nothing of the moral of it.

Why has your great supporter of strength—beef—been raised without work? An ox raised without his having worked, is not so good food as one that has worked. The British phenomena of oxen of 3,000 to 4,000 pounds are not wholesome eating. No ox should be without work any more than his master, the mule or the horse. If, therefore, men will have beef, a large class of farmers must raise it. These arguments stand the shock of all the machinery in the world, and forever will. So that man, with all his wonderful, almost miraculous inventive powers, will never invent roast beef and steaks out of the old line.

We have already felt, in England and here, the rising cost of beef, so great as to drive millions to eat hogs, who, as the black said at the South, "are the only gentlemen. Massa work, missey work, I work, horse work, ass work; hog he no work!" The hog has never to our knowledge been employed, notwithstanding his health and strength, to earn one cent, in all Ohio, or in the world beside. And it does not appear that if he were to do reasonable work on a sort of tread-mill, that his health and flesh would not be the better for it. This I do know: that the hogs which run at liberty in woods and fields make hams and sides of double excellence. I have seen such hogs leap a low rail-fence in Georgia. The Westphalian hams were of the like character.

While we are making vast improvements in agriculture generally, we must look next to our roast beef and hams.

China lost the power of making roast beef by having too many people. She could raise mountains of rice, and that feeds her.

Centuries to come ought not to bring us to bare vegetable food. John Bull no longer eats roast beef, and what is eaten by the rich is too fat to be wholesome Not one in ten can afford to buy it. Does half New York eat it? It is very costly. Scotland and Ireland do not.

I see enormous droves of hogs daily entering our city. Shall we have to study Deuteronomy on pork-eating? Is it wholesome?

Poultry is readily raised. But what do we pay in our market? Eighteen cents per pound! It can be afforded by reasonable management at six cents!

Division of labor proves the grand source of supply. That is the only way by which the supply of silk is had! A million cottages or small farms? Silk or poultry!

LIGHTNING.

Letter from Robert Wilson, Keene, N. H.:

KEENE, N. H., Aug. 21, 1860—3 P. M.

As I have dabbled in lightning rods a good deal for the past thirty years, permit me to give my experience for what it is worth.

Question 1. Does a rod possess power to attract electricity from the ground to the highest point, or only that part above the building? Answer. All parts attract alike; but as the cloud is usually above the building the portion nearest to it attracts the most strongly.

Question 2. What might be the rule in placing points as to their distance apart? Answer. The more points the better, as they draw out the electricity from the cloud the more rapidly, and pass off to the ground.

Question 3. The idea is prevalent that the rod will protect a circumference three times its height above the roof? Answer. There is no certain criterion about it, as, if the rods are large, the points plenty, the connection to the ground perfect, and what is almost absolutely necessary also, that the lower end of the rod shall be continued down to water, no cloud, be it ever so heavily charged, but will be discharged down the rods safely and quietly.

Answer to question 4. As electricity passes on the surface of the metal, the larger rod will convey it off the most rapidly.

Answer to question 5. Glass or horn rings for the rod are unnecessary, as electricity never leaves a good conductor to pass over a bad one.

Answer to question 6. I put a point to every chimney, carrying a plain iron wire up in the smoke of the chimney, about two feet above the brick work, as electricity will take the smoke and moisture combined from a fire and follow it down.

Answer to question 7. It is better to connect the rods all over the house, as the charge can then pass down and off on each to the ground.

Question. Is a solid brass or copper point as good as silver or gold? Answer. The only advantage of a sharp point over a blunt one is that it draws off the electricity quietly; a blunt point causes it to snap and crackle. I suppose a couple of thousand dollars are invested in fancy lightning rods within sight of my window.

Twisted copper rods, hair rods, put up ladder fashion, solid iron as big as a hoe-handle; each year brings a new crop of patents for lightning rods. Now, let me tell you how I make lightning rods. Go to the hardware store and buy a bundle of iron wire of about the size of the largest used for telegraph wire, or near the size of a pipe stem; build a fire of chips and sticks exactly as the blacksmith heats his wagon tires, and anneal the bundle of wire to make it flexible and tough. Have a quantity of light staples made by the blacksmith of a size to straddle the wire. Then carry your wire over the ridge-pole at one end of the house to the ground at the opposite side of the end, serve the other end of the house ditto, so that the wire comes down each corner of the house, snugly fastened every four feet with a staple. Then carry a wire along the ridge-pole and twisted around the two end wires and soldered fast to the same, and so up each chimney, bending it so as to stand above and over the centre of the flue—the wire merely rounded with a file at the ends. Now, sir, for the lower end of these rods; and all is useless, and worse than useless, unless this part is properly arranged; for this part, take strips of sheet copper (such as tinmen use to make kettles, tinned on one side), one inch or one inch a and half in width, solder lengths enough together to reach from the wire down to water in the ground; turn a ferrule on the upper end of the copper, and slip it over the bottom of the rod and solder it fast, the lower end of the strip buried in the ground

and lying in water. Serve the rods the same at each corner of the house; so you have four connections with the ground. This is cheap and permanent, and any man can put it up himself. Sixty pounds of wire will cover a large house. Three things I insist on, viz: 1. That the wires shall be thoroughly connected all over the house, and soldered. 2. Thoroughly connect them with the copper strips; and, 3. The copper must be carried down to water or very wet ground.

Your secretary asks (sarcastically, I suppose,) whether lightning rods are really a protection? I answer that three in four are really no protection at all, from defects in the connection, or have got out of order. Two of our churches have nice rods upon them, but the lower ends of them lie upon the surface of the ground to-day, and are really exposing the buildings worse than if they were away. Barns are more frequently struck than houses, especially when full of hay and grain and the moisture and electricity passing up in a continuous stream into the heavens. Barns should be protected and the rods carried up high, and in the column of moisture, so as to intercept the electricity before it reaches into the building.

Let me ask your secretary if he ever knew a building with a copper roofing to be injured by lightning? And yet Prof. Page used the roofing of the Patent Office at Washington as his battery for years, in his experiments. It was always active and alive with electricity.

A FEW WORDS ABOUT CORN AND POTATOES.

The distance between hills should depend upon the kind of corn. For Southern and Western five feet is about near enough for a profitable crop. For Dutton, three and a-half to four feet. For early Canada I planted once twenty-two by twenty-four inches, four kernels in a hill, and I had one hundred and one measured bushels on a measured acre. Never top corn, and why? The sap which is elaborated in the leaf and upper part of the stalk is fitted to perfect the corn. The best farmer in our country settled that question years since. In a large field of corn he topped several rows, left the same number to ripen unmutilated, and cut up by the ground an equal portion at two different periods of growth, viz: one when the kernel was fairly seared, and another when the corn was thoroughly seared. The result proved conclusively that the corn cut at the ground when fairly seared was the best and heaviest, and the fodder was also

best of all. Refer to Mr. Abijah Wilder of this town, who tried the experiment. The topped corn was the poorest of all. I say, drills for corn by all means. Each time you haul dirt to the stalk, it throws out a new set of roots, as corn requires breathing tubes at the ends of its rootlets. Go into a corn-field which has been left "decently alone" after it is two feet high, and try to find an inch square of ground without corn rootlets protruding from it! Does the plant know best what it requires? If not, cut and haggle away at its roots, as your grandfather did before you! Enough of that. Did you ever plant potatoes in the fall of the year? I have; and got the handsomest, earliest, and best potatoes I ever raised. I did this wise: selected a piece of corn land (on which no water could stand in the winter), ran a furrow six inches deep, dropped potatoes of "hen's-egg size" in the trench then back-furrowed each way upon the trench. Potatoes came up about as early as others did. Dressed the rows with the hoe at once, merely to smooth the ground and keep down weeds. Harvested earlier and more of them per acre than others, and of sixty or seventy bushels not a peck of small ones! Each time potatoes are hilled they will throw out a new set of fibers, and form a new set of potatoes.

USE OF PORK AS FOOD.

Wm. S. Carpenter.—The best hams that we have in this country are from hogs fed upon beech nuts; but hams of hogs fatted upon corn are much better than those from what are generally known as mast-fed hogs. I am told that a great portion of the food of some western hogs is rattlesnakes. In some places hogs are kept for the purpose of clearing the woods of rattlesnakes.

R. G. Pardee.—It depends partly upon how hogs are fed, but more upon the manner of curing than anything else as to the quality of hams. They can be made almost as delicate as tender chicken. All hams should be cured by the following compound of articles:

To 100 pounds of ham use 8 or 9 pounds of rock salt, 2 ounces saltpeter, 2 pounds of white sugar, 1 quart of best syrup, 4 ounces saleratus, and 1 ounce allspice.

These materials are boiled and scummed, in ten or twelve gallons of water, and the hams packed in a barrel, and the brine put on cool, adding water if necessary to cover the hams. None but a new oak barrel should be used. Scald the barrel and cool it before putting in the hams. Let them lay three weeks, and then take them out and air them twenty-four hours;

put them back again three weeks, and then take them out and dry them thoroughly before smoking, which is done in an airy smoke house, with cobs and maple or hickory chips. It is then a most delicious article of food. In smoking, be careful to keep your hams cool; never allow fire enough to heat the meat.

Mr. Brice.—About working hogs, I will state that a friend of mine made a tread-mill in which to work hogs, so arranged that it dropped corn forward of the hog, which he strained after, and in so doing pushed the wheel back.

PERSIMMON SEED FROM JEDDO.

Dr. Lockwood presented some persimmon seed from Jeddo, which he requested Mr. Carpenter to plant.

THE ROOTS OF CORN.

Judge Meigs.—I once saw where the rain had washed away all the earth from the corn, so that I had an opportunity of seeing the immense number of small rootlets; the soil was completely filled—not an inch of space without roots.

PLANTING POTATOES IN SEPTEMBER.

Mr. Carpenter related a fact of a neighbor of his planting potatoes in September. They grew till killed with frost, and he then covered the hills with a foot of manure. The tubers continued to increase in size during the winter.

HILLING CORN.

Andrew S. Fuller.—I want to know why hilling corn is not beneficial. All increase of mellow earth about the roots makes plants grow luxuriantly. Does it not do the same with the corn? Now, I want to know why hilling is not beneficial?

Mr. Carpenter.—It shuts out the air from the roots, which need to come to the surface, as well as to have plenty of earth.

Mr. Pardee.—It is probable that the hilling up, throws the plant into the necessity of a new process, just as it does fruit trees. It is only deep-planted trees that throw out suckers. By hilling up we produce unnatural action in the plants.

Mr. Fuller.—In horticulture we are constantly trying to improve upon nature. It is not planting deep that produces suckers upon trees. If a graft is set upon sucker stocks, those trees will produce an abundance of suckers. I do not advocate deep planting of trees, or hilling corn; I only ask for reasons for doing or not doing it. I trim trees, root or top, to produce a proper equilibrium.

NICHOLAS LONGWORTH ON DELAWARE GRAPES.

Solon Robinson.—I hold in my hand an interesting letter from Nicholas Longworth, of Cincinnati, whose name is identified with grape culture and wine manufacturing, all over this country, as one of the pioneers in the business. It will be recollected too, that Mr. Longworth was one of the most persistent, and probably most consistent, opponents of the Delaware grape; believing it to be identical with the red Trominer, of Germany, a worthless variety for cultivation in the United States. This fact will make the letter which I will now read, the more interesting. It is dated Cincinnati, Oct. 18, 1860, and says:

"In relation to The Tribune report of the American Institute Horticultural Show, I have errors enough to answer for without having wrong ones thrown on my shoulders. The Delaware is a hardier Grape than the Catawba. From years of experience, and a trial of American Wine Grapes, proper ground culture, more than thirty years, I came to the conclusion that no foreign grape would succeed in our climate, and ceased to cultivate them in the open ground. I obtained cuttings of the Delaware ten or twelve years since. It is the slowest growing vine I have ever seen. The bunches and berries are very small, and of superior quality as a fall grape, and gives promise of making a superior wine. But I do not believe an acre of the vines will produce more than two-thirds of the crop that the Catawba does. My vines, ten or twelve years old, are not one third as large. I have a graft of a native grape, two and a half years old, that this year bore 130 bunches of grapes of a good size. The Delaware vines, from their slow growth, and small size, should be planted one-third nearer than the Catawba or Isabella, and thereby increase the crop. Last spring, and the spring previous, I had the Delaware grafted on the Catawba. It has greatly increased its growth. The question is, will it so continue to grow. The Diana I deem superior as a table grape to the Catawba.

"I have a dozen vines in my garden that have been in bearing three years. More than three-quarters have shriveled and rotted before any of them were ripe. In this vicinity I have heard the same complaint. It has been contended that the Isabella grape belongs to the Fox family. I have always denied it. The Catawba is a superior Fox grape. If you plant its seed nearly all will go back more or less to the Fox character, and lose its quality. The Union Village is a seedling of the Isabella. I this

year had 25 of its seedlings to bear, not one of them bearing resemblance to the Fox. All like the Union Village. But most of them larger than the Isabella. Four the size of the Union Village, and some produced a red must, and will make a red wine. The Lincoln is not among the grapes named by you. I believe it suited for your climate. I believe it will make a wine of fine quality. We must look up our best native grapes and plant their seed. I believe grapes of the Fox family will be found superior to the Catawba, both for wine and table use. To find the best we must not go too far North. Though I have some of fine promise from New Jersey and Connecticut.

Yours truly,

N. LONGWORTH."

Mr. Fuller.—The Diana grape that Mr. Longworth speaks of does not generally produce shriveled berries. The Delaware vine is not a very strong grower, but a healthy one.

Mr. Doughty of New Jersey said his Delaware vine had produced this year a growth of 21 feet.

CHRYSANTHEMUMS.

Mr. Mitchel of Yorkville exhibited a very superb collection of these flowers. The great improvement made upon them within a few years, is worthy of attention by all who have a foot of ground upon which they could place one of these autumn flowering pants.

NOVEMBER STRAWBERRIES.

Mr. Cavanach and Mr. Fuller both spoke of their beds of Bartlett vines, now bearing a very good crop of fine strawberries. The vines started in ordinary garden soil, and have not been watered or extra fertilized. This variety is one of the best for cultivation under glass that is known. The city of New York is yet to be supplied with strawberries in winter, and it is a question of some importance to get the best variety for cultivation under glass, not for curiosity but for profit as a market fruit. The Fontenay raspberry, is a variety that can be cultivated to advantage under glass. The vines are now in full bearing.

Subject for the next meeting,—"The fall transplanting of trees."

Adjourned.

H. MEIGS, *Secretary.*

November 12, 1860.

Present, 40 members. Mr. R. G. Pardee in the chair.

The Secretary, Judge Meigs, opened proceedings with the following statement:

WINE AND GRAPES.

Some years ago I met with a very extraordinary article on this subject. Records of the quality of them, with little interruption *for about six hundred years*, showing how very dependent this vintage always has been on *weather*, so that good ones are scarce, being at intervals of three to four years. We are familiar with the idea that the climates of the world change greatly. This error wants correction. Strabo visited England 1850 years ago, and states, in his account of it, the prevalence of fog and rain, and the rare bright sunshine. His remarks on the climate of the Crimea, Black Sea, &c., precisely accord with the facts of our day. The fertility of soil under rational treatment always remains, but the limits of vegetables are marked on the globe by boundaries unsurpassable. The noble efforts of England and France to acclimate plants and animals, and cotton especially, fail to a great extent, and both of them must have cotton from the United States or go without. Great efforts have been made to substitute flax! Expensive chemical experiments have all failed to make flax or any other fibrous plant a substitute for cotton. The crop of flax is very small—the manipulation costly. While our cotton yields vastly more per acre with far less trouble, and at last is what we want, *cotton!* As there is no substitute for flax or wool, so none for cotton, which we see lately has ceased to be vulgar, and is called *King!*

AGRICULTURE, &C., OF NORTH CAROLINA.

We have the November number of *The North Carolina Planter.* We are fond of everything clever from this State. Our recollections are all favorable to it as a stable, sensible, safe, republican people. This "Old North State" has had fewer whims in its head than any other State. I know not why, but fifty years of acquaintance have taught me so much. For thirty years one of her citizens represented her in Congress. That man was never excelled for wisdom and goodness by any man that ever lived—Nathaniel Macon—who abstained from the grievous "slang-whang" (as Washington Irving called it), but his judgment and decisions were admired. The Old North State has been slow,

but sure. She is now increasing her agricultural power. She employs an able engineer, Mr. Emmons, to examine, scientifically, her extensive swamps, with a view to drainage and culture. The engineer states that these lands, when reclaimed, will become the best in the State to grow cotton; that there are two millions of acres of them, which will be worth four millions of acres of their upland to grow cotton. The cotton on two millions of acres will be worth over fifty millions of dollars. These lands will not require any fertilizers for a long time, and are easy of cultivation. England and France have examined the world, and found no land and climate, rains, &c., equal to those of the United States.

The Planter says, about forty years ago the French farmers at Detroit used to put their stable and other manures on the ice in winter, so that it might be carried away from them. Some others removed their stables to get rid of their manure-heaps! Wisconsin used to burn her wheat straw after thrashing out the grain; and this practice still continues on some of our prairies—an almost exhausting and ruinous course—so that instead of twenty-five to thirty-five bushels an acre, they now get seldom more than fourteen bushels per acre! The poor soils of Scotland and England are now giving an average of thirty-three bushels per acre! He says that salt, as recommended by Prof. Mapes, has been tried on cotton, on alternate rows, and prevents rust. He recommends one peck of salt well mixed with four bushels of lot manure, eight to one, and likes it better than guano.

England contains 50,000 square miles; so does North Carolina. The swamps of the latter can be and are being drained, and two millions of acres of the best cotton land in the world will soon be bearing a thousand pounds of pure cotton per acre, or not less than about $50 to $100 worth per acre. Holland has drained the land on which she is and was powerful, although it was below the sea level. North Carolina is above it. The whole world has been of late ransacked by the great powers for a cotton-growing land! The United States possess the only region suitable for it.

ELECTRICITY.

We owe it to ourselves to see what our predecessors did in every science.

Mons. Sigaud de la Fond, Professor of mathematics in Paris, 1776, states that the analogy of electricity and magnetism was

first stated by Massenbroek; that Franklin and Daliband adopted it from observations made on compasses struck by lightning.

A glass globe exhausted of air is revolved on its poles; with friction on its outside, it becomes luminous within—very brilliant zones of light play in it, no electricity being sensible on the outside.

Dr. Palinière, when cleaning the upper part of a common barometer, saw light in the vacuum above the mercury. He tried it on a transparent glass bottle, and found light within sufficient to distinguish objects in the dark. There is a perfect analogy between light and electricity.

That electricity moves more freely in vacuum than in air. The Abbe Nollet at that time thought that electricity passed through glass.

Dr. Mimbray, in October, 1746, applied electricity to the forcing of vegetation, and proved that little branches and buds were quickly grown by it. Mons. Tallabert, of Geneva, tried a couple of hours a day to produce the same effect on plants—on gilliflowers and violets—and succeeded in increasing their stalks and branches. The Abbe Monon in 1748, succeeded with the renunculus. Hyacinths appeared to me to succeed best.

Mons. Pivati believed that in the human body electricity would prove the potable gold, it having cured a gouty bishop as by miracle.

Zanotti thought that the sparks from balsams did it.

Bianchi, of Turin, believed in its cure of paralysis.

A collection of those experiments was published in Paris in 1763.

Mons. de la Sonne, a distinguished physician of the first order, for a long time examined these experiments of Nollet and others in the Royal Hotel of Invalids, on great numbers of paralytic soldiers, and pronounced that medicine could not flatter itself with having any great advantage from all these electric experiments.

DEEP PLOWING *vs.* DROUTH.

A discussion now ensued upon the advantages of deep-plowing against drouth.

Adrian Bergen, a Long Island farmer, stated that several cases had occurred within his knowledge where crops had been saved from damage by drouth by deep plowing. Mr. Bergen exhibited specimens of white flint corn, grown by him, which ripens very early, and produces well.

CHANGE OF CLIMATE.

This question was discussed by several members.

Dr. Trimble said that he thought the climate had been materially changed by clearing away the forests.

The secretary thought no material change had occurred in the climate of this or any other region.

Andrew S. Fuller and Solon Robinson both contended against the theory advanced by Dr. Trimble, that the prairie region was once wooded. They contended that the prairies have never been wooded. The land is now just in the natural condition of the bottom of a lake, from which the water has receded and the land dried up, and which first produces weeds, then grass, and afterwards trees, as the prairie land now readily produces them where fires are kept out.

Wm. S. Carpenter.—This has been a most remarkable season. We have had no frost in Westchester county hard enough to kill Lima beans. At least, they are still green in many places.

APPLES FOR STOCK.

Mr. Carpenter stated that many farmers in Westchester county are feeding apples to cows, at the rate of a bushel a day, with good results. He thinks them worth more as food for stock than they will sell for to make cider. The weather has been very favorable for gathering apples; yet there are vast quantities of them still on the trees or on the ground.

Wm. Lawton of New Rochelle confirmed the opinion of the value of apples for feeding stock. In regard to the changes of weather, he is satisfied that the seasons are remarkably equable. This he judges from notes kept for twenty years.

Mr. Hurlburt of Connecticut thought apples would increase the quantity of milk, but that they will not produce as much butter. He would not feed apples to milch cows, unless it was for those kept for milk and not butter. He thought sweet apples preferable to sour ones.

Mr. Carpenter said that those who kept cows for producing milk for the city had found great advantage in apple-feeding.

APPLES FOR PIGS.

Dr. Trimble thought sweet apples would answer pretty well for pig-feed, but apples were liable to make cows dyspeptic.

Mr. Hurlburt said that apples would fatten pigs, but the pork would all fry away.

Mr. Carpenter said that the pork crop of Westchester county would be largely increased by the great apple crop, and if the pigs were fed on corn, to finish off with, the pork would be solid and sweet.

WINTER PEARS.

Mr. Carpenter exhibited the Glout Morceau, the Columbia, the Redding, Easter Buerre, Charmontel, Vicar of Winkfield, and several other varieties, good for cooking and eating. He thinks there is no difficulty in any farmer in Westchester county producing fine crops of these winter pears, with no more trouble than growing winter apples.

OLD-STYLE APPLES.

Mr. Lawton showed fruit from an apple tree 120 years old, very large, sound, and healthy. It is called the "Grandfather apple."

He also showed Vandevere apples from trees sixty years old. Also, apples resembling the Newtown pippin from trees of the same age. These trees have produced fruit every year for ten years.

FRUIT TREES ON PRAIRIES—WINTER PROTECTION.

Solon Robinson said upon this subject: We advocated the plan 25 years ago of planting orchard trees on the surface, hauling up a sufficient quantity of earth to cover and support the roots, instead of putting them below the natural level of the earth, where, in many sites that we have seen orchards planted upon, the water would stand for weeks, so as to completely cover every fiber of roots. This is not alone the case upon flat prairies, but frequently where it is quite rolling, the soil being of such a nature that it retained water almost as well as a sponge.

Had the plan been generally followed by those who have planted orchards upon rich loamy, prairie soil, there would have been now many more thousands of apple trees alive in Michigan, Indiana, Wisconsin, Iowa, and Missouri, in all of which states we hear annual moanings over winter-killed fruit trees. If all orchards were planted and tended like the one mentioned in the following extract from a letter in the Prairie Farmer, we should cease to hear anything about winter killing. We advise all prairie orchard owners to put the plow at work before the ground freezes. The letter alluded to says:

"I visited, not long since, the successful orchard of 75 acres owned by Mr. James Wakeman, of Cottage Hill, Du Page county. One of the leading features of this orchard is, that the trees have the appearance of being planted on ridges, which has been caused by annually plowing towards the trees. He commences to plow next the tree first, which leaves a deep furrow in the center between the rows, which acts as a partial drain—a very efficient surface drain in winter. For when the snow thawed by the influence of the sun, the ground being frozen, it runs into the hollows. It cannot penetrate the soil. If the slope is completed to the dead furrow, it goes there. But if there is a hollow immediately about the body of the tree, water flows there. I have seen it stated recently that the expansion or lifting power of ice is nearly equal to twice the lifting power of gunpowder. Hence the effect of a body of ice immediately about the body of a tree—hence, too, the importance and benefits of banking up with earth in the fall, immediately about it. I have had trees destroyed in this manner by ice forming about the collar. I have seen hardy grapes ruined in the same way. Scores of trees, whose bodies are otherwise protected by the sun, are killed at the collar by this lifting ice. It is a good plan, I think, to bank up about trees in the fall, and especially to plow orchards as above described."

It is a good plan—there is no doubt of it—to plow every orchard upon retenive soil, in the manner indicated; and the advice, like the almanac, is suited to all places in this latitude.

Dr. Trimble.—I have had some experience in winter killing trees. In one case the roots were protected by snow upon unfrozen earth, so that the ground is not below 40°, while the temperature of the tops was 15° below zero.

Andrew S. Fuller.—There is not one acre in a thousand at the West that will grow fruit trees well without under-draining. I succeeded there in growing good pears, by setting the trees on ridges upon a well-drained soil. He thought water the greatest trouble about fruit trees on the prairies.

FALL PLANTING TREES.

Upon this question Mr. Andrew S. Fuller made the following remarks:

That we have made progress in fruit culture cannot be for one moment doubted; but whether we have progressed as rapidly as

we ought under such favorable circumstances as those in which we are placed, is a question. The same spirit that has furnished us with the telegraph and the steam engine, has also furnished us with fruits and flowers from all parts of the known world. While in some of the departments of horticulture it seems that we have scarcely made any visible amendment for at least two thousand years, yet in others we have made rapid strides toward scientific perfection.

Possessing a climate and soil equal, if not superior, to that of any other country, and what is still of great importance, a government that does not crush our zeal by a burden of taxation, we are allowed to cultivate whatever we like, and in whatever manner we choose. Under such auspices, it is no wonder that thousands have turned their attention to this branch of industry, and invested their capital in nurseries.

Twenty years ago the cry was, that the country would soon be overstocked with nurseries and nursery trees. But that much looked-for day has not yet dawned upon a fruit-loving community, and we fear it never will.

There is at least ten millions of fruit trees for sale in New York State to-day. Will they all be sold? Most assuredly. "Will they all live and bear fruit?" No, not one-half of them. There are several reasons why they will not, among which we may mention that many are unsuited to the climate, others are grafted or budded upon stocks that have not sufficient affinity for the graft to make a permanent and perfect union; many will die in being transported from the nursery to the place where they are to be planted, owing to improper packing.

But the great destroyer, and the one who thinks everybody and everything to blame—soil and climate included—is the planter himself; while the nurseryman, as well as others who are careful in such matters, will take trees that have been boxed up on board of a vessel from two to four months, and plant them, and not lose one in a thousand. Another person will take trees fresh from the ground, and plant them again within the hour, and yet he will not make one half grow. "Why this wholesale destruction?" Simply because the planter is ignorant of the first principles of vegetable physiology, or he is wofully negligent.

We are obliged to confess that we, as a nation, are very ignorant in regard to many things that pertain to the garden. Most

of the European nations are in advance of us in this branch of industry. Besides, wé have no patience; when we undertake to plant trees we hurry through the job. If it is well done, so be it; if poorly done, we blame somebody (generally the poor nurseryman), but never ourselves.

As fall planting of trees is the question for to-day, it may be asked, "Is the fall of the year the best time to plant trees?" To which question we would answer, "Yes, for some kinds, but not for all." We would never plant evergreen trees in the fall, but always late in the spring, just at the time they commence to grow. Apples, pears, hardy ornamental trees and shrubs, we would plant in the fall, provided our soil was well drained either naturally or artificially. If trees are planted in wet, heavy soil in the fall, the roots are very likely to rot or be very much injured before spring.

When trees are planted in the fall, in suitable soil, the wounds that are made on the roots while being transplanted become healed over, a callosity is formed, from which or near which the new roots put forth. It is a disputed point among vegetable physiologists whether the callous which is formed on the root is indispensable in the formation of new roots. But one thing we do know, and that is it seems to be natural for plants to form this callous before they emit new roots.

We make cuttings of hardy trees and shrubs in the fall, for we have found that cuttings made at this time root much more readily than if deferred until spring. This is evidently owing to two causes; first, they are not exposed to the cold, by which they lose much of their vitality and power of emitting roots from the alburnum or inner bark, which is always more or less injured by severe cold; second, when cut and put away in a dark place, and where the frost does not reach them, they are placed in a position to commence the change from branches to roots, which they must undergo, if they live. Now, it takes time for a plant to make this change, and it is evident that we had better give plenty of time than too little. Further, roots will form at a much lower temperature than that at which leaves are produced, and owing to this fact we can have our plants rooted and ready to furnish nourishment to the leaves as soon as they put forth.

Trees transplanted in the fall and the roots properly prepared, cutting off all broken parts, and smoothing the ends with a sharp

knife, will commence the formation of roots in the spring long before the leaves are produced. Yet most persons will succeed better with spring planting than with fall planting, because trees require much care to keep them in a proper position through the winter, when they have lost a portion of their roots.

In transplanting trees, either in the fall or spring, they should always have a portion of their branches cut away; no matter how careful the operation may be performed, the roots will surely receive a check, and some of them may be lost; therefore, to establish an equilibrium between root and top, a portion of the latter should be cut away. We always shorten the branches at least one-third when we transplant any deciduous tree.

If we receive trees that have become dry and shriveled by long exposure, we bury them, root and branch, in the ground, and let them remain there until they have swelled out to their original condition; then lift the top branches first; then, in a few days, lift a portion more, and so on until the whole stem is exposed. Then take it out and prune it severely and plant it. A tree that has become so dry that it would never show a sign of life if planted immediately, will often make a vigorous growth the first season, if treated as we have described.

One fatal error into which many fall is in burying large old trees instead of small, young and thrifty ones. The old adage, "Haste is not always speed," is wonderfully true in this case.

Peach trees of one year old are the only ones that should be planted, shorten their side branches to two or three buds and the main stem one-third, wash the roots clean and examine them carefully; see that you do not plant a peach worm with the tree. Trim the roots and then dust them over with ashes. After the tree is planted put a handful of ashes or lime around the stem on the surface of the soil, this will almost invariably prevent the peach worm attacking the tree the first year; next year put a little more lime or ashes around them, keeping the ground clear of weeds during the entire season with the hoe or cultivator is indispensable, and must not be forgotten. Nectarines and apricots should be treated in the same way.

Cherries and plums may be safely transplanted, when they are two or three years old, but we prefer two year old trees to any others.

All of our stone fruits are liable to produce gum from their wounds, and this often prevents them from healing over, and the

older the tree the more liable it is to become diseased from its wounds.

This can be seen by examining an old cherry tree which has had a branch broken off; it takes a long time to heal over, if ever; while on a young tree it heals over quickly, scarcely leaving a sign of the accident.

Pear trees may be transplanted at almost any age or size, but as a general thing two or three years trees are the most convenient size to plant. In planting dwarf pears, we want all the quince stock to be covered; the junction to be one or two inches below the surface. If the root is too long, and there is danger of the lower roots becoming injured by being buried too deeply, cut off a portion of the lower end. If your soil is as deep as it should be, and well drained, then the quince root will remain perfectly healthy one foot below the surface; if it is not, then you had better defer planting dwarf pears until you can properly prepare the ground for their reception.

Wm. S. Carpenter.—I never would buy a tree grafted on a quince stock over three inches long.

Mr. Fuller then illustrated the manner of cutting and preparing trees for planting. He said: There is no danger of planting dwarf trees upon land that is dug two feet deep. The quince stock should always be buried so as to throw out roots, but if the root is too long, be sure to cut it off. Trees should never be grown in the nursery with deep roots. Care should be had in cutting back the first year's growth of a tree, to cut it at a bud opposite to the side budded, so that the main limb will balance the tree.

He also trims the roots very carefully, cutting off all the ends of long roots and most of the fibrous roots, and all that are broken or bruised. He recommends deep planting upon dry soil, and thinks it not worth the cost to plant trees on wet soil. He also illustrated how to trim the top of a dwarf tree so as to make a good tree of handsome shape. The great feature of this was cutting back very short the first year's growth. Never plant a tree with a full top. Pruning in the fall makes the strongest trees or vines. Spring pruning produces the most fruit. A weak-growing tree should always be trimmed in the fall.

Quince stalks are grown from cuttings; and I prefer them not over six or eight inches long. These are heeled in with ends barely out of the ground in the fall. The Angier quince makes

the best stalks for grafting upon. It grows rapidly, and produces strong, hard wood. All cuttings of quince, or currants, etc., should be frozen, and put in the cellar, or buried away from the frost.

The question of fruit trees and fall flowers will be continued and discussed at the next meeting.

Adjourned.

HENRY MEIGS, *Secretary.*

December 3, 1860.

Present, 40 members. Mr. Doughty, of New Jersey, in the the chair.

Mr. W. S. Carpenter presented some fine specimens of apples, viz: Rhode Island Greenings, Ottley Pippin and Newtown Pippin. After describing the qualities of each kind, he exhibited some specimens of large potatoes. The Prince Albert, with him, excelled all others in their qualities, and produces two hundred bushels per acre.

Mr. John G. Bergen.—I prefer the Rhode Island Greening—with us it is a superior apple.

Mr. Lawton.—I have some very old trees which, by the system adopted, bear abundantly every other year. We deem them one of the best apples grown.

Mr. Nash.—I set out an orchard in Amherst, Mass., that contained 400 trees, now reduced to 300. They are growing finely. I attribute the success of cultivation to lime in the form of wood ashes. I also use bone phosphate.

Mr. Carpenter.—The best way to force a tree to grow is ashes, but as that cannot be had conveniently in sufficient quantities, lime of the ordinary kind would answer when properly applied, and continued so as not to exhaust the soil.

Dr. Crowell, of New Jersey.—With us, the Rhode Island Greening bears every year. The trees he experimented with, he trenched around them; if a portion of the fruit is pulled off before maturing, the remainder will be superior.

Dr. Trimble.—The borer is very destructive to the apple tree, burying themselves deep in the wood, and can only be eradicated by the Ichneumon, which has lately sprung into existence, and has in a great measure destroyed the borer and saved the trees.

Mr. Carpenter.—The borer attacks my young trees, the old ones take care of themselves.

Mr. Bergen.—Different localities aredifferently affected by the borer. The woodpecker destroys a portion of the insects.

Dr. Trimble.—The Peach worm actually girdles the trees. Some years ago New Jersey raised but few apples; the trees were mostly destroyed by insects.

The question of the day being the best mode of feeding cattle, was then considered.

Mr. Carpenter.—The appearance of the Durhams gives them a decided preference with some; but for giving milk, the Native cow, if well fed and cared for, are not deficient milkers.

Mr. Lawton.—The disease among the cattle five years ago carried off a great many of the older ones. A pair of oxen he had, took the disease: by allowing them to ramble during the day and housing them at night, they recovered.

Dr. Crowell wished to know if the question was as to fattening cattle for beef or milk; his own cows he fed high. The new process of pulping the food is approved of.

Mr. Carpenter.—I feed the roots to my cattle without washing.

Prof. Mapes.—I approve of the pulping.

Mr. Lawton.—Good hay is the proper food for cows; but when milked, they require ground food. I stall-feed my cows. One pound of good hay is equal to seven pounds of turnips, My three cows give about twenty quarts of milk each daily, and the calves from them has realized $200.

Prof. Mapes.—The farmers of England were at one time nearly crazy on the nitrogenous food; but it is not the amount of pabulum, but the amount the animal can appropriate. When the food is cut, it does not add to its quantity, but it is in a better form to be appropriated and assimilated. Six quarts of oats and six quarts of carrots, is in better condition for food than either of them would be alone. The farmers now use pulping food in preference.

Dr. Trimble approved of turnips; his family objected on account of the taste given to the butter. He had, however, overcome their objection by the mode pursued by him in feeding before milking.

Prof. Mapes drew attention to the cooking of the food for cattle, it proving, by experiment, that two-thirds the quantity will produce a better effect than uncooked food.

The same question continued.

JOHN BRUCE, *Secretary pro tem.*

Dec. 10, 1860.

Present—60 members. Dr. E. F. Peck in the chair.

A letter was read from Judge Meigs on Crab Apples for Cider, saying it was a good substitute for Champagne.

Mr. Carpenter.—Crab-apple cider now commands more than double the price of apple cider.

The Chairman spoke of the crop of carrots in Glen Cove, of over 1,000 bushels to the acre. 1,050 bushels to the acre gives a profit of $71. A crop of ten acres, on the waste lands of Long Island, in 1858, was equal to any other in the county of Queens. Two yoke of oxen will plow two and a half acres a day. The scrub oak that covers the ground grows in clusters; the mode of grubbing is by cutting the tops off with the grubbing hoe, the tap roots are then taken out, and bring a good price for blacksmith's use; they plow each side of the roots, by which they are easily taken out, at a cost of $10 an acre. Onions are raised on this ground at a good profit.

Mr. Fuller asked the Chairman if he could demonstrate the truth of his sayings; he spoke of the land being exposed to the cold winds, that was against their being taken up.

The Chairman.—I plowed the first furrows on these lands, and raised fifty-five bushels of wheat to an acre, being a premium crop. That the land is superior to that cultivated by Mr. Fuller on Myrtle avenue, as it contains no stone, and is not more affected by winds than other parts of Long Island. That the timber being cut or burned off, the winds blowing from the shore is warm and genial. Large crops of hay are produced on the land. Fifteen load of stable manure was put on the land, and 150 lbs. per acre of guano where the wheat was raised.

Mr. Haight, of Dutchess county, brought some choice grapes and was asked to speak of them, they were Isabella grapes; he described his mode of culture, using largely of hen manure. In laudation of his grapes he said he was an Isabella man; he continued his remarks on his mode of their preservation, in which the Club were quite interested.

Mr. Carpenter replied that from what Mr. Haight had said confirmed him in the opinion that the Isabella was only suitable in certain localities, and in such localities only will they prosper, otherwise they were worthless, and cannot be compared to the Catawba, Delaware, and other varieties.

Mr. Fuller made some remarks on the mode of culture of grapes

to prevent roots from disease, and all successful plans, in his opinion, depend altogether in cultivation and pruning, having the old wood, or the fruit raised, to be as near the old wood as possible; this was the mode three thousand years ago, and is equally true at this day.

CATTLE RUNNING AT LARGE.

A paper was read by Mr. Solon Robinson on the subject of cattle running at large on the public roads, denouncing the practice. He read that the fences would require to be horse high, bull proof and pig tight. The paper was an excellent one on the subject.

Mr. Carpenter made some remarks in approval, and stated his own experience and the annoyance and loss he has been subjected to; by pounding your neighbors' cattle engenders ill feeling that no one desires.

Mr. Fuller gave his opinion; although he lives within city limits, and the policemen are frequently to be found in his garden, yet he is continually annoyed by cattle.

The Chairman remarked that he agreed with the remarks made by Mr. Robinson and Mr. Fuller, his own experience corroborated them all; he said, it is a subject that should be kept before the people.

A patent broom was then exhibited, the owner desired a committee appointed to report on their utility.

Mr. Carpenter, Mr. Robinson, Mr. Doughty and Mr. Fuller were appointed such committee.

Same subject continued.

JOHN BRUCE, *Secretary pro tem.*

December 16, 1860.

Present, 56 members. Mr. R. G. Pardee in the chair.

Dr. Peck exhibited some scrub oaks, both trees and roots, together with some of the soil on which they grew, and described the manner in which they grew, giving the account kept by a neighbor of his, of the cost of clearing, and found that the wood and roots had fully paid the cost of clearing. This statement was confirmed by Mr. Fleet.

Dr. Peck also exhibited some turnips of large size, grown on this land, sixteen hundred bushels being raised on the acre; also large onions, four hundred and ninety bushels to the acre. A

man will plow an acre a day of this land, each way; then plow a compost of fish and soil, with fifty pounds of potash dissolved in water, to the acre. He has seen very excellent crops of wheat, cranberries, &c., raised on this land.

Mr. Solon Robinson said a friend of his had the refusal of 200 acres of the land for eight dollars per acre. Mr. Spence knows a person who owns sixteen acres; he refuses one hundred dollars per acre.

Mr. Bergen asked if the land improved by cultivation?

Mr. Spence replied that it did. The scrub oak, after being cut, has grown eight inches in four months, on his place.

Mr. Bergen asked, what use was made of the wood?

Dr. Peck.—It is often spoken for, beforehand, by blacksmiths and others; and spoke at length on the land. The Hicksville depot is 150 feet above tide water; wells there are ninety feet deep; the land descending. Hempstead Plains he considers the best land in the State.

Mr. Robinson said there was no difficulty in plowing these lands as is found in plowing prairie land.

Dr. Snebly had explored these lands, and wrote a pamphlet on them, which was shown. Two tons of hay had been raised to an acre, on this land, that had received no manure for seven years. Peaches had been raised at the rate of 1000 baskets on thirty acres. One man has 1000 acres, spends $1000 a year on it, and has reaped $10,000 from it.

Mr. Carpenter.—The land, from the specimen shown, is capable of being brought to great perfection by cultivation, by proper culture in using manure adapted to its wants. He would prefer this land to much that is in Westchester county.

Dr. Peck.—Give this land the same culture that is given to land in Queens county, or other parts, and it will be excelled by none.

Mr. Carpenter.—There is an advantage in this land; it will retain what is put on it in the form of manure. He liked it on that account.

Prof. Nash.—On seven-eighths of an acre he knew forty dollars of cranberries raised. The higher the land the deeper the loam. The valleys were less deep; forty inches on the high to six on the low land.

The question of the day was then taken up, viz: the

BEST MODE OF FEEDING CATTLE.

Mr. Nash was in favor of cut feed. He was sustained by Mr. Carpenter and Mr. Madison.

Mr. Gale was opposed to cut feed as unnatural; God furnishing no cutting machines other than the teeth of the animal, the teeth being the best cutting machines.

Mr. Carpenter.—The ox and man differed in this; as the ox had two stomachs, he found great advantage from cutting the food for cattle.

Mr. Cavanach.—The stage proprietors would not cut the food for their horses, if they did not find an advantage from it.

Mr. Carpenter.—If you can convert more food by cutting, which is the fact, as there was no waste as was the case in feeding long feed.

Mr. Bergen.—I feed in the old-fashioned way; the hay in the rack, and the corn on the cob.

Mr. Madison.—It pays best to cut the feed.

Mr. Fuller.—The great secret of cut feed consisted in the meal, &c. that is added, not in the cutting.

Mr. Nash.—Hay was the dearest feed in this country. In the far west, where the cattle can pick a portion of their living in winter; but here they may be kept on poorer hay, with something that is good and stimulating in addition.

A committee was appointed to examine the Cataract Washing Machine, consisting of Prof. Nash, Mr. Adrian Bergen and Mr. Cavanach.

Adjourned to the second Monday in January.

JOHN BRUCE, *Secretary pro tem.*

January 7, 1861.

Present, 63 members. Mr. Robert L. Pell in the chair.

The following translations and extracts from Judge Meigs, were read:

[Journal de la Société Impériale et Centrale d'Horticulture. Paris, Sept., 1860.]

THE INSECT POWDER.

On mature investigation, it seems that the accounts of the plant producing it and the land of its origin and growth have been mistaken. Introduced by Willemot as the "*Pyrethrum of Caucasus*," but now proves to be the "*Pyrethrum Cinerarifolium*"

(*ash leaved*) growing in Dalmatia, Venetia and Georgia, in shady, sheltered and stony places. M. Treviranus, of the botanic garden of Breslau, named it *ash leaved.* But the *P. roseum* and *carneum* are extensively cultivated now for *insecticide powder*, (the capsules are pulverized). It was introduced from Dalmatia into Italy long ago, for it was cultivated in the botanic garden of Padua, as a rare plant in 1660. *It is of the Chamomile family.*

TREE PLANTING IN FRANCE.

Mons. de Courval, on his place of about 3,400 acres, has planted the most valuable trees—nearly 300,000 forest trees, all in order *heads balanced*, and all growing finely. He has 36,000 young ones about three or four feet high. Among these, the *Giant Washington, of California, four feet high!*

Session of September 27. Mons. Payen presiding.

Two enormous yellow pumpkins or squashes were presented by M. Fournier, gardener of the Maria Theresa Hospital of Paris. One weighed 123 kilometres, and the other 112; or nearly 300 pounds and 254 pounds.

The largest I ever saw was raised by David Gelten, late collector of New York, 224.

Mons. Fournier says that he has for a long time planted in succession, the seed of the largest. M. Gelsten let *only one* remain on his vine. I let all grow, and had 700 pounds the whole of them together, but the largest was only 72 pounds.

H. MEIGS.

TOMATO

Suffers from a malady like the potato disease—and this as well *under glass as in open air!*

STRAWBERRY

With very large *flat* berries and also *flat* stalks.

APHIS LANIGERA.

The woolly plant-louse—we owe to America. It came from there about the beginning of this century. But Salisbury says England got it from France, in the reign of Louis XIV, brought over to Paddington by some refugees.

Sir Jos. Banks said it went from England to France, and was brought to England from America on some apple trees set out in a nursery at Chelsea. Lime has failed to cure the evil. Warm

solution of glue is advised—so is an equal weight of rosin and fish oil. Trees have been cured by using *coal tar.*

CALCEOLARIAS.

Sow the seed *when one year old,* in the latter part of August.

BROOM CORN.

The following facts were stated in relation to broom corn, by T. F. Englebrecht. He said that it was estimated that 2,000 tons of broom corn had been received in this city within a year past, from Illinois; from Ohio, 500 to 600 tons, and the same quantity from the State of New York. The quantity grown in the New England States is mostly manufactured before it reaches the city.

The average price of broom corn brush is six cents a pound for the green sort, and four cents for the red brush. The average crop per acre at the West is 400 pounds; in this State, 350 pounds; in New England, 250 pounds.

Wm. S. Carpenter.—It is not profitable to grow broom corn on a small scale; but as a crop it does appear to be profitable, otherwise the Shakers would not grow it so largely. Mr. Carpenter recommended the cultivation of dwarf broom corn.

Solon Robinson stated that there were serious objections against this variety—the sheaf of the upper leaf adheres so closely to the stalk it is very difficult to separate it.

THE GOLDEN PIPPIN.

Mr. Carpenter introduced specimens of this old sort of apples, which he highly recommend as worthy of cultivation. It is a variety not now to be had at nurseries. The apples were tested, and pronounced excellent.

HORN-PITHS FOR MANURE.

In answer to this question, it was stated that horn-piths do not vary materially from other bones; but they are more easily reduced to a condition suitable for manure.

THE CATARACT WASHING MACHINE.

This washing machine was favorably reported upon to day, by a committe heretofore appointed to examine its work.

PRUNING GRAPES AND OTHER PLANTS.

This regular question of the day was called up, and Mr. Andrew S. Fuller, horticulturist and nurseryman, of Brooklyn, was called upon to state his views, which he did in part as follows:

There is no branch of American industry that is attracting so much attention, or which is destined to become so prominent a feature among the industrial resources of the United States, as that of horticulture.

For the last twent-five years we have been in a whirlpool of excitement, caused by the introduction of new fruits and flowers, new books, and new theories, all of which have been sought for with an earnestness amounting to almost infatuation.

While such a state of feeling exists in regard to this branch of industry, it would be strange if some did not listen to bad counsel, and, in their eagerness to outstrip their neighbors, fall into errors which will defeat the object in view, and in some cases effectually cool their zeal to become a devotee of Pomona.

Americans are made of such excitable material that it is difficult to make them travel in one direction a sufficient time to thoroughly test any new branch of business, unless it gives unmistakable signs of repaying tenfold on the investment. Any thing that is likely to enlarge the purse is surely to be attended to immediately.

Our people are not penurious when purchasing plants, as the high prices at which our new varieties of grapes are now selling so extensively will prove. But it is that careless, heedless manner, in which they cultivate (or entirely neglect) a plant after they get it into their posession that makes us complain. They will buy Delaware vines at $50 per dozen, and then refuse to pay a laborer a few dimes to keep the weeds from smothering them during the summer.

After purchasing a tree, and it is safely deposited in the soil, they consider their part of the work done, and that there is nothing more to do, but wait for the tree to grow and produce fruit in abundance. There is one part of the programme that is generally fulfilled to the letter—i. e., they have a good time waiting.

That we have many good cultivators, our markets plainly show, but that there are too many poor cultivators is eqully true.

It is this desire to get rid of the expense and trouble of cultivating their trees properly, that leads so many to listen to any theory that will give them an excuse for neglect.

Deep working and thoroughly pulverizing the soil, have always been acknowledged by good ctltivators to be indispensable to success in fruit culture; yet let any one who can reach the ear

of those who are looking for an excuse say that deep culture is needless, and he will have scores to bear him company on his road to destruction, simply because shallow culture is the least expensive in the beginning, although often the most expensive in the end.

The importance of pruning cultivated trees no one who has had experience, or who will listen to that of others, will deny; yet we have among us a class of men who will tell us that it is unnecessary. They will argue that trees have no pruning in their wild state, and that is proof enough for them that they do not need it when cultivated. But such arguments are unbecoming intelligent cultivators, and I am happy to say by such they are never used.

The objects of pruning are various; among the most prominent are, promoting the formation of fruit-buds; lessening bulk; modifying form; promoting growth; increasing the size and proper distribution of the fruit among the branches; creating an equilibrium between root and stem; removal of diseased portions of the plant, &c., all of which should be kept constantly in view when the operation of pruning is being performed, for by doing it we will save much time and be more likely to produce the intended results. As the time allotted for discussion to-day will not allow us to speak of more than one branch of this subject, we will confine our remarks to the pruning of the grape.

There are various opinions in regard to the best form in which vines should be trained. But all of them that have been successful for any considerable length of time have been founded upon the same principles. All successful plans are commenced by a gradual accumulation of wood from two to six years, at which time the structure may be considered as finished, after which the vine is not allowed to extend, always pruning it to the same point as nearly as possible from year to year.

The vine is thus made to produce its fruit very near the old wood. This is very important when high-flavored fruit is desired. The importance of having old or matured wood in close proximity to the fruit is a principle so generally conceded to be true by experienced vine growers, that in the best wine districts of Europe they seldom attempt to make wine for the purpose of testing the quality of a variety until the vine has been established for several years.

It is generally admitted that our young apple orchards do not

produce fruit of as high quality as they do when the trees become older, and it is equally true that the fruit of the vine does not get its full quantity of richness until the plant has become fully established.

There has been many theories advanced for the purpose of explaining the cause of this change. Joseph Hayward, in 1815, declared that it was his opinion that the greater length the sap has to pass through the body of the vine, the more abundant, fine, and high-flavored will be the fruit. But when thoroughly tested, his theory was found to be erroneous. The real truth of the matter is, that it is necessary to have old or well matured wood as a basis upon which to grow your fruit. A superabundant quantity, instead of being beneficial, is deleterious.

This is one reason why all the various plans that have had for their object the entire renewal of the vine biennially or triennially from the same root have been discarded when thoroughly tried. These renewal plans have often been brought forward by theorists, but what is equally true, none of them have succeeded; and at the present time not one of them is in successful operation. Another difficulty which we have had to contend with when growing vines on these renewal plans is, that we are obliged to resort to such severe pruning at the time of renewal that we destroy the equilibrium between root and top. When the vine has become fully established (say from five to ten years, and no vine can be considered as established in less time) it is with great difficulty that it can be restrained sufficiently to produce a healthy shoot from the one eye or bud to which it is pruned.

The large amount of food which will be accumulated in the roots of a healthy vine, and is constantly being collected by them cannot find employment, and the new shoots or shoot which put forth cannot consume this superabundant supply, and a sort of plethora is produced. A portion of the roots become inactive, and consequently decay.

Let any one examine the stump of a large tree that has been cut down, and he will see this fully demonstrated. A few trifling shoots may be produced which will grow rapidly, but the greater portion of the old roots will die in consequence of the sudden check they have received. Some varieties of trees will not produce sprouts at all from the old root when the top has been cut away, while others will produce them in abundance.

We believe the only true mode of renewing the entire vine

when it has become enfeebled by age or accident is, by layering a portion of its young shoots. This is the general and successful method practiced in old and established vineyards.

The first pruning a vine receives is at the time of planting, at which time it should be cut down to one eye or bud above the ground, from which one shoot is allowed to grow. This should be kept tied to a stake, all side shoots or laterals, as they are termed, pinched off, leaving one leaf on them the first time; if they start again, pinch them off, leaving another leaf, and so on through the growing season.

The second year cut this leaf down to two buds if strong, but if weak, cut again to one bud, and repeat the operation as the first year. When the vine makes a strong growth the first season, it may be safely cut back to two buds, and from there we allow two shoots to grow, which must be attended to during their growth; such as tying to stakes or trellis, and pinching off laterals, as was done the first year.

The third year we are supposed to have two strong shoots from one root, and we are now ready to adopt the plan on which we intend to train our vine. Nearly all the systems now in use start from this point, whether it be the bow system, thornery, or the common trellis plan; this seems to be the starting point for them all.

A very simple plan, and one which is peculiarly adapted for a trellis, is formed by bending down the tree-shoots, which we should have on our vines at the end of the second or third year, to form horizontal arms, leaving them about two feet long. The shoot that grows from the end bud we save for continuing the arm next season. But it should not be lengthened more than two feet in any one season. Only the number of buds required for the upright shoots should be left to grow upon these arms. The upright shoots are to be cut down to one or two eyes every year, and from the young shoots that spring from these we obtain our fruit.

Another mode is to cut down every alternate shoot to one eye and the others to four or five, the long canes bearing several bunches and the others none. Next season this order is reversed, those bearing this year bear none the next, &c.

Sometimes a vine is planted in a trench five or six feet from the trellis or wall on which it is to be trained, and each year a portion of the vine, say two feet, is layered, and thus we go on,

step by step, until we reach the trellis, and have formed over two shoots for arms. The object of this layering is to get a large quantity of root before the vine is called upon to produce a large quantity of fruit. There is a sufficient amount of top allowed to remain on the vine each year (which is also allowed to bear fruit) to keep the roots active and healthy. Whatever system you adopt *let it be vigorously adhered to until you succeed or fail*, and in case the latter is your fate, you may confer a great favor upon others by doing so, for it is often the case that the failure of one man is of more benefit to the community than the success of many. If you do not adhere to the one system that you start with, we cannot tell whether it was your neglect or the fault of the system that caused the failure. Of course we are supposing that there is no fault in the variety or in the cultivation.

Mr. Fuller then proceeded to illustrate his observations upon vines provided for the purpose, and also by plates to be found in Dr. Grant's catalogue, which, by the by, is one of the best treatises upon the vine and its cultivation to be found in print. Mr. Fuller advocated the single eye system for propagation, as likely to produce the best vines in the shortest time. The old wood serves to nourish the new shoot until it can send out new roots to sustain itself. The best plan for training vines for family use is upon trellises. No vine should ever be trained upon an arbour for any other purpose than a shade. Never use an arbour to grow fruit. It is very difficult to arrange an old vine into any good shape—to make a good vine, you must start aright with a new vine. Upon whatever plan you train your vines, make your fruit grow close to the ground—that is within reach without using a fireman's ladder.

PRESERVING FRUIT TREES.

William S. Carpenter, a practical orchardist of Westchester county, who has been very successful, read the following paper upon this question:

Trimming is now reduced to a system. By dwarfing various kinds of trees, such as the pear on the quince stock, we are enabled to train it and keep it within our reach, and make it both ornamental and useful. The most approved form is the pyramidal. In order to form a perfect pyramid, we should encourage the tree to branch near the ground, and train the side branches so that they will be regularly distributed along the body of the tree. In order to effect this, summer pruning or pinching is re-

sorted to. Having as many side branches as we desire, we may continue its shape by pinching off the laterals from the side branches when they have grown to about three inches in length, taking care to leave these laterals about one inch long after you have pinched them; these will again push and grow, and must be treated as before. This method of summer pruning will check its woody growth, and force it to expend its energies in fruit-bearing, and at the same time increase the size and quality of the fruit. For standard or orchard trees, a different treatment must be practiced. For these, but little pruning is necessary, beginning when the trees are young, and annually going over the orchard. Cutting out all suckers and crowded branches, you avoid the necessity of cutting off large limbs in after years—a practice that should always be condemned. I have seen whole orchards nearly destroyed by this injudicious pruning. A limb should never be cut from a tree when more than two inches in diameter. Pruning should never be done except late in the spring or in midsummer. I would never prune a tree in winter. A limb cut off when full of frost will cause the wound to crack and split, thereby admitting the air into its wound, which will soon cause it to decay. It is to be regretted that so little attention is paid to the orchard. It is quite common to see suckers growing around the bodies of trees, until they are nearly hid from view, their branches covered with moss, and putting on altogether a stunted and neglected appearance. You come to the conclusion that the owner of such an orchard does not think that fruit-growing is profitable. The wonder is that such trees bear at all. But they will make an effort, as it is natural for all fruit trees to reproduce; but the specimens will be miserably small and deficient in flavor. If we desire good fruit, an orchard that will pay, trees that will delight us and our friends, we must do something for them. We must clear away all suckers, scrape off all the old rough bark and moss, that have been the safe abiding places for the destructive insect, and then with a solution of potash and water wash the trunks and limbs of the trees. If the orchard is yet young plow it, and put on a good top dressing of manure, and then cultivate a crop of potatoes or corn, or any other crop that will require thorough tillage; follow this practice for a few years, and you will find it will most effectually renovate your orchard, and you will be made to acknowledge that fruit-growing is profitable, and that your orchard is your

dependence and delight, and you will be found encouraging your neighbors to plant, and thus extend this delightful branch of industry.

What an interesting field of labor does horticulture present, contributing largely to our pleasure, and at the same time a source of great profit. No calling is more congenial to our best feelings; none better calculated to elevate our minds, or to develope the purest sentiments of our moral natures. Fruit and flowers, though silent, (to me,) are eloquent preachers. As we open the book of nature, and turn over its leaves, the more we investigate her laws and her benevolent provisions, we are more fully convinced of the instructive lessons she teaches. I would say then to all, cultivate fruit and flowers; assemble these rural comforts around your cottage; they will increase your local attachments, and make home more pleasant. Horticulture has been encouraged by the best men of all ages, and few have done more for the cause than the lamented Downing. His works are left behind him, and his name will live in the memories of all who knew him.

We have to record the death of another whose labors have done so much for the cause we are advocating. The name of Samuel Walker of Boston will long be cherished by the inhabitants of the rural districts. Few men have done more for the cause of horticulture. For many years he took a lively interest in the horticultural department of the American Institute of this city—exhibiting his splendid collection of pears at our annual exhibition, to encourage others to engage in fruit growing as a source of pleasure and of profit. May the memory of such men live forever.

Prof. Nash inquired what dressing should be put on where large limbs are cut off.

Mr. Carpenter answered, gum shellac, dissolved in alcohol.

A. D. Robinson said he had found that shellac thus prepared peeled off.

Mr. Roberts said if dissolved in alcohol, and then water added, and boiled until the alcohol is evaporated, it won't peel off.

Mr. Fuller said a solution of ammonia is the best solvent of shellac.

Mr. Burgess stated that rubbing deer's tallow over the wound would prevent decay.

Mr. Lawton said he had found a coat of white-lead paint answer all the purpose.

John G. Bergen.—I have often seen limbs taken off and heal up without any covering. Is it not somewhat owing to the season when the pruning is done?

Mr. Lawton.—The best way to patch up an old vine is to dig it up and throw it away, and plant a new one, and properly cultivate it.

Mr. Lawton called up the question about propagating by grafts from old or young trees. His opinion is that a graft produces a new tree, and that the decay of the parent has no effect whatever upon the graft. All that is necessary is to get a thrifty shoot for a graft.

CONTROLLING THE SAP OF PLANTS.

The Chairman, Mr. Pell, made the following statement in relation to this question:

I have tried several experiments during the past summer by which I am led to believe that much advantage may accrue to the agriculturist if he will adopt the plan I intend to propose of controlling at will the sap of all plants, which the generality of farmers give themselves very little concern about. It may be because they are sometimes ignorant of physiological laws which govern the course of sap.

When we place manure near our plants it soon becomes a liquid, enters the spongioles and rootlets, ascends through the body of the plant, thickens, and descends again to the root, depositing in its passage a layer of alburnum, not only making the wood, but leaves when its circulation is rapid, and fruits when that circulation becomes slack, either by nature or the obstacles man may oppose to it. All pruning, root-trimming, inoculating, and grafting are subordinate to this principle. The past has been a very growing season, and I have had numerous trees and plants which became entirely too vigorous, and gave everything to luxuriant branches and wood, instead of fruit. With a few specimens I cut off a portion of the roots, and thus prevented the quick distribution of sap. I drove nails into the trunks of others, thus breaking the capillaries, and impeding its action, others I encircled with gimlet holes. All these modes had the desired effect, but seemed a violent process. I then tried the plan of bending the limbs and small branches some of which were compressed against the stem of the tree, with the most happy results, as at each curvature I retarded the sap, and

determined the whole tree to production and fructification. I found on compressing a limb of an apricot tree, in my fruit house, against the trellises, the effect produced was to crowd the alburnum, and choke the sap channels, thus inducing a determination to produce fruit. At the same time I interfered with the flow of sap, by extracting the leaf bud from the end of each branch, which materially interfered with the flow of nutritious juices, disturbed the tree's functions, and developed a fruit spur. Thus you may, by preventing a flow of sap, readily convert a bud that was intended to produce a leaf into a flower bud, which is in reality nothing but an abortive leaf. When you have a tree containing a great flow of sap, you will have no fruit, and you cannot prevent this flow by trimming largely, because the roots will still supply sap for a time, as if it were necessary for them to feed the parts cut away, and will then form new wood. With such a tree it would be far better to trim lightly, rub off a number of buds, and bend the branches slightly from their perpendicular position, and fruit will ensue. Some persons retard the sap by removing a portion of bark from the undersoil of the limb. This injures the tree, and is by no means the advisable course.

What I have said respecting trees, applies to nearly all plants, and vegetables. When your peas have reached the second flower, you may stop the circulation by pinching them off, and thus urge them to form branches, and develop pods. Beans may be treated in the same manner. If this is not done at the proper time, you will promote the growth of leaves instead of pods. I have grown squashes to weigh 201 lbs. by preventing the rapid circulation of sap, by bruising the vine beyond the best fruit, which is better than to cut it off, as there would then be an entire suppression. If you will tie the stems of a bed of onions in knots, and leave a contiguous bed untied, you will perceive a marked difference in the yield; twist the tops of beets, carrots and parsnips, slightly, when two-thirds grown, and the roots will be far larger and firmer. When Lima and other beans have reached the third of the length of the pole, unloose them, let them hang down, and you will collect a much earlier and far more productive yield. My cauliflowers this season were immense; many would not go in a half bushel measure, denuded of leaves. It was accomplished by breaking the leaves around them from the time they were the size of a man's fist, until full grown. By thus breaking, the sap that would naturally have

gone to form an immense mass of leaves, is disposed of for the rapid growth of the head.

Potato tops, in my opinion, should never be cut off, as is practiced everywhere; when this is done partially a great number of small potatoes are immediately developed, and when entirely there is no more growth of tuber.

Potatoes are not formed until the vine has made a complete growth; the buttons then appear, and may be pinched off with great advantage to the tuber, as at that period the sap requires to be stopped that the tuber may be formed. Shortly after this period, bend the top, and fasten it down with a small parcel of earth, which will produce a great development under ground, and amply reward the agriculturist for the trouble. If corn is topped at the proper time, it will add largely to the yield. Tobacco may be pinched at a certain stage of its growth, and leaves will form 2½ feet long, and 14 inches wide.

It is not the loss of watery vapor alone that produces these effects when plants are topped; because, beside these, all plants exhale at the same time volatile compound in less or greater quantities. We are familiar with the fact that such exhalations arise from the petals of all flowers, often of an odoriferous character; by the emission of these matters the trimmed plant no doubt relieves itself of what would prove injurious if retained. Of the chemical nature of these exhalations little or nothing is known.

If a branch of a living tree is bent so that a few of its leaves can be placed under the edge of an inverted tumbler of water, and then exposed to the influence of the sun's rays, bubbles of gas will immediately form on each leaf, and after a short period of time will rise through the water and collect on the bottom of the tumbler.

When vapor escapes from the leaves more rapidly than the supply of water from the roots, the leaves wither. You often observe this in growing crops in hot weather.

The ascent of the sap is generally modified by the season, heat of the weather, and age of the plant. During winter the circulation is very slow, and increases as the season advances. The sun's rays accelerate the movement of sap much more than the temperature of the atmosphere, which is shown by the fact that in winter there will be a circulation on the side where the sun falls, when it will be stagnant on the opposite side. This will

account for the annual layers of timber being much thicker on one side of the tree than the other. The newely formed roots of a tree are prolongations of the newest wood, and they become the principal absorbents from the soil, the matters absorbed by them passes through the wood with which they are most nearly connected, but never through the old heart wood, which is not capable of transmitting fluids.

To satisfy yourselves of this fact, thrust a stem of newly cut wood into any old or dark colored solution, and the new wood will become dyed while the heart will remain white.

Mr. Pell in answer to the question, said that he has raised 70 bushels of wheat per acre, and thought it possible to produce 100 bushels by proper feeding of the plants. The proper time to cut wheat or rye is when it has turned brown four inches above the ground. The grain is then in the dough state, and is superior in quality to grain fully ripened. I leave the cut grain three or four days in the swath, to perfectly dry, and thrash immediately.

Subjects adopted for the next meeting,—"Culture of cotton in this latitude," and "raising of poultry."

Adjourned.

JOHN BRUCE, *Secretary pro tem.*

January 14, 1861.

Present—58 members. Dr. Trimble, of New Jersey, in the chair.

The following translations by Judge Meigs, the Secretary, were read:

[Journal de la Société Impériale et Centrale d'Horticulture. Paris, Nov., 1860.]

The following scientific works have just appeared, viz:

Nuovi Principi di fisiologia applicati al Agricoltura. 8vo., 240 pages. Milan, 1860.

Economia Rurale e il Reportorio d'Agricoltura, from the Journal of the Agricultural Association of the Sardinian States, and the Royal Agricultural Academy of Turin. Nov. 10, 1860.

Amico del Contadino (Peasant's Friend), in the Theoretical and Practical Agricultural Journal of Dr. Gaetano Cantoni. 8vo. No. 19. October 10, 1860. Milan.

I Giardini. A Horticultural Journal by an Anthiphile (Lover of Flowers). 8vo. 7th year of publication. October, 1860. Milan.

A new salvia, the scabiosæfolia, is introduced from the Crimea.

Calathea fasciata (by Regal & Koernicke), from Brazil, a beautiful plant, low, leaves horizontal, rounded oblique and marked with broad bands (on top) of alternate white and green, and below tinged red, bears white flowers. A beautiful specimen was given to the Society last year by the Princess Helena Paulowna.

A learned inquiry into the history of the potatoe, by Mon. the Baron Croesa, of Berges. He says the potato was believed to have been brought to Europe from Columbia about the year 1565, about 20 years before it was brought by Drake to London, where he gave some of the tubers to Gerard the Botanist, who then lived in London. The learned Clusius is the first who mentioned the potato, and Parmentier was the first to introduce its culture into France, and to him the title of Benefactor of Humanity has long been granted, because *famine so frequent and terrible before the introduction of the potato has never been known since!*

R. G. Pardee.—The government of France was very anxious to introduce potatoes among the people, and the expedient was resorted to by Parmentier of cultivating a field, and when ripe, issuing a handbill, offering a large sum as a reward for the discovery of any one interfering with the crop. The result was that all were stolen, and thus the public got a taste, and soon grew fond of the new article of food.

SALT HAY AS MANURE.

Solon Robinson inquired the value of salt marsh hay for manure, or rather whether the manure made of it is of any great value.

Wm. S. Carpenter stated that he had seen very beneficial results when used as a mulch.

Wm. Lawton stated that salt hay is now about one-fourth the price of timothy hay, and if not as good for manure, it is very useful for bedding.

R. L. Pell.—Salt hay contains three ingredients; straw eleven ingredients, therefore straw is just so much more valuable as a manure.

Wm. S. Carpenter.—Our sea-side farmers use a great deal of sea weed, and I don't see why salt hay is not nearly as good as sea weed. We all know that it is extensively used as manure with the best results,

The Chairman.—Salt hay is extensively used in New Jersey,

and there is a great anxiety among farmers to get it, and hence I suppose it is considered valuable; I should like to know how valuable.

Mr. Doughty, of New Jersey, said salt hay was good for horses with the heaves.

Andrew S. Fuller.—Salt hay sells with us in Brooklyn at $10 a ton; that is its commercial value.

Mr. Cavanach.—As a manure, I would just as soon have shavings as salt hay.

Mr. Quinn of New Jersey.—We use large quantities of salt hay, and do not consider it of any value as a manure except as a mulch. It possesses no fattening qualities, and is of no other value for manure than as a mechanical divisor. More of the salt marsh yields only half a ton per acre than more, and the value of the land is from $5 to $50 an acre.

TAMING THE HORSE.

R. G. Pardee.—It is my opinion that it is worth $5 an evening to any farmer, to listen to one of Rarey's lectures. His instructions how to handle wild horses are of the most valuable kind to all persons who ever handle horses. His instructions are not only valuable, but very entertaining.

Mr. Carpenter.—I spent fifty cents, and got what I consider $50 value for the information thus obtained.

THE NORTHERN SPY APPLE.

Mr. Carpenter introduced the Northern Spy apple, which was tasted and highly approved. It is one of the very best apples grown.

Mr. Fuller remarked that the tree of this variety of apples is one of the handsomest of the family.

THE PRODUCT OF ORCHARDS IN WESTCHESTER COUNTY.

Mr. Carpenter made the following statement in regard to product of orchards in his vicinity:

The following five farmers, located on North-street road, in the town of Harrison, Westchester county, New York, within one and a quarter miles in extent, have produced the following results from the orchard in the fall of 1860:

J. Carpenter:

18,750 gallons cider at 8 cents per gallon	$1,500 00
250 barrels apples, at $1	250 00
Total	$1,750 00

S. Haviland:

37,800 gallons cider, at 8 cents per gallon..........	$3,000 00
200 barrels apples, at $1..........................	200 00
Total	$3,200 00

D. Purdy:

25,000 gallons cider, at 8 cents per gallon	$2,000 00
100 barrels apples, at $1..........................	100 00
Total	$2,100 00

D. Griffin:

15,625 gallons cider at 8 cents per gallon...........	$1,250 00
1,100 barrels apples, at $1........................	1,100 00
Total	$2,350 00

D. Carpenter:

13,750 gallons cider, at 8 cents per gallon	$1,090 00
300 barrels apples, at $1..........................	300 00
Total	$1,390 00

Total product of the five orchards $10,790.

A NEW PREPARATION OF FOOD.

Solon Robinson.—I promised the club before the holidays, that I would introduce a new article of food, or rather an old article prepared in a new way, and tell farmers how they can grow and prepare upon their own farms a substitute for rice, farina, tapioca, sago, etc., for culinary purposes—something, in short, that shall be as good as either of the above substances for the use of the good housewife, to make a pudding—a pudding that is not a mere adjunct of a dinner, but a real substantial addition to it; as hearty as one of corn meal, more wholesome than that, more toothsome, and equally cheap, so that it is within the reach of all, both rich and poor; and as I think it a valuable discovery in the preparation of food, I am anxious that everybody should enjoy the benefit of my discovery.

HOW IT WAS MADE.

So he said: "Will you pop for me a pint of your nice, white pop-corn?"

"Yes; but what project have you got in your head now?

Some experiment, I'll warrant. If you are going to make a pop-corn pudding, it will, I fear, be a waste of time and material, and prove a great failure."

"No matter; there is much to be learned by failure as success. Let us try."

So we did. The pint of pop-corn was put through the operation, and it made sixteen pints of popped corn, such as is sold in the streets at four cents a pint. This was first crushed with a rolling-pin on the kitchen table, and then ground in the coffee-mill into a coarse meal, which measured eight pints. Five pints of this were mixed with four pints of sweet milk, and set where it would warm and soak. [It should soak a couple of hours or more.] Then two eggs, sugar, raisins and spice were added, just as you would add such things to a rice pudding, and then it was set on the hot stove and boiled a few minutes, stirring it several times to get the meal well mixed with the milk, because it inclines, from its great lightness, to float, and if baked without stirring there will be a brown crust on top and custard at the bottom. It was baked about an hour, and served hot, and eaten with great satisfaction—satisfaction that a new ingredient for a delicious, rich, wholesome pudding had been discovered—one always at hand, easily prepared, and one that has never failed to gratify the taste of a score of persons who have since tried it.

THE COST OF THE PUDDING.

The cost of such a pudding to a farmer is the cost of the sugar, raisins, and spice—the milk and corn I count as nothing. What should I count the cost of five-eighths of a pint of corn and four pints of milk, which, if not eaten upon the table, would go to the pigs? The eggs would sell hereabouts for four cents, and the things bought cost as much more, in a pudding that fed eight hearty people. Let us then eat pudding—good, rich pudding—as much as we can eat at a meal, at a cost of one cent each. It is cheap—try it, and say it is good.

POP-CORN GRIDDLE CAKES.

Another use for this pop-corn meal is for griddle cakes. To my taste, they are quite equal to rice cakes, cooked in any way that rice is, and are much heartier. In fact, there is no stronger food for a laboring man than any of the preparations of corn in the way I have indicated. At the same time its digestibility is unquestioned. The philosophy of the advantage of thus prepar-

ing corn, is worthy of our attention. Of all the cereals, Indian corn requires the greatest action of fire to fit it for food. It is full of essential oil, and that needs to be cooked, and it can only be done by a very high heat, or a long-continued moderate one. If long continued, the other constituents of the corn are sometimes injured, and so are the ingredients added to the meal. If not well cooked any article of food prepared from corn meal has a raw taste, and is not so digestible as wheat flower. Now, in popping corn, it is subjected to a very high heat, which thoroughly cooks the oil, and fits the corn at once for food—a food that almost everybody loves. and so will everybody love the various preparations of food from meal made of popped corn, for it may be eaten without fear by the dyspeptic, and it will be eaten with satisfaction to appease hunger. I beg you all to give it a fair trial.

Mr. Gale spoke highly of the advantages of thus preparing corn. He said that any kind of corn can be made to pop, by adding salt to it.

Mr. Carpenter congratulated the discoverer and the country upon this new preparation of our great staple crop. He enquired of Mr. R. his opinion about the keeping qualities of such meal.

Solon Robinson.—As we know that corn and corn meal, properly kiln-dried, will keep a long time, we may safely argue that meal prepared by a still more perfect system of fire-drying will keep an indefinite length of time, or just as long as we wish. If ground and packed in barrels, the pop-corn meal will keep better than corn meal or flour, or even whole grain.

Mr. Lawton.—This specimen of food is worthy of high commendation, as are all new discoveries in improving articles of food. I look for good results from this discovery. The pudding is excellent, as I believe every one here fully agrees.

COTTON IN THIS LATITUDE.

The question was called up, whether cotton can be cultivated in this latitude to advantage, or what will serve as a substitute.

Mr. Carpenter stated that experiments lately made by Mr. Allen, of Boston, indicate that a substitute for cotton can be cheaply grown, and will be a very profitable crop. He reduces flax to an article which he calls "fibrilla," by an inexpensive process.

R. L. Pell.—Horatio Allen, of this city, invented a cannon by

which cotton is made of flax by discharging it by explosion of powder.

Mr. Gale.—The cost of picking cotton may be estimated upon the basis of twenty pounds a day to the hand.

The Chairman.—The great difficulty about cotton culture is the waste of the land. It is not because it cannot be grown further north than it now is—it is the cost of production. But cotton can be grown in Africa, and efforts are now making to introduce its cultivation there pretty largely. In Algeria experiments are making with a new silk worm, which bids fair to furnish a substitute for cotton.

R. G. Pardee.—Cotton does not exhaust the land faster than flax. Its cultivation has been given up in some places on account of its exhausting the soil.

Wm. S. Carpenter.—I do not consider flax any more exhausting than many other crops. Wheat exhausts so that it cannot well be continued year after year.

CLOVER BLOSSOMS AND HUMBLEBEES.

The Chairman stated that clover blossoms are fertilized almost entirely by the humblebee, and the reason why the first crop does not bear seed is because these insects are not sufficiently plenty at that time to fertilize the blossoms.

Mr. Carpenter stated that the Italian honey bees can feed from the red clover blossoms.

Mr. Quin.—I have a different opinion from some about land being only impoverished by plants maturing seeds. Clover never produces over six bushels per acre of seed, and that of course does not exhaust the soil; but that is not all. Clover is an air plant, and has a long tap root, which, in its decay furnishes fertility, and thus keeps the land in good condition, which would be exhausted by a grain crop, but not because it ripens the seed, but because the plant does not furnish such fertilizing materials as clover does.

Mr. Gale.—I don't believe in exhausting soil by any crop, if it is properly pulverized. The more we prepare the soil, so that roots can penetrate, the more it will produce, and the longer it will last. Adjourned.

JOHN BRUCE, *Secretary.*

January 21, 1861.

Present, 60 members. Mr. Robert L. Pell in the chair.

The Secretary, Mr. Meigs, who is confined to the house by sickness, sends the following translation and extracts, which were read:

TRUFFLES

Are always in demand by people who can afford to have luxuries.

A familiar joke was fashionable in Paris some forty years ago. Thus: "Voulez vous des truffles? Il faut allez en Perigord"—*Talleyrand Perigord*, where the only truffles were found.

Lately they are found elsewhere. Mons. Bailly de Merlieux says that they are now found in considerable quantities in the Pare de Veaux, a part of France where they were before never known. He calls it a *perfect mushroom*, whose modes of production are well known. It is said to be an excrescence from the root of the oak tree, due to the puncture by an insect. There is no truth in this. Few if any truffles are found out of Talleyrand's native Perigord.

WILD DOCK.

One of the first useful vegetables of the spring, gathered extensively for the table, and by some palates relished as much as asparagus.

In 1825, I found that it was carefully cultivated in the gardens near London, and I sent for the seed. I sowed this then in drills, and when well up, left one plant every eight or ten inches. The growth was rapid and vigorous; so much so, that many days before I had greens to boil, this had leaves about two feet high and four inches wide. It far excels the wild dock in tenderness and flavor. I continued its cultivation for many years, and lost it by removing to another garden.

I never saw it in our markets or gardens. It is so easily grown and so easily cut for market, that I recommend its general cultivation.

The dandelion appears wild at about the same time, and is extremely easy of culture. I never cultivated any plant of more ready and sure growth, and the roots last giving successive crops of leaves.

The great markets cannot well be supplied with conservatory plants. A cheap early green for the table is wanted by nine out of ten families.

COOKING FOOD FOR STOCK.

Solon Robinson read a letter from T. H. Collins of New Albany, Ind., asking the club to discuss the value of cooked food, by steam or otherwise, as compared with raw food for domestic animals. He wants, and so do all farmers, all the light that can be obtained upon the subject. He also thinks the question of soiling cattle one that may be profitably discussed. And finally he thinks the reports of these meetings in The Tribune are about worth all it costs him.

Adrain Bergen of Long Island.—I use steamed food for my stock constantly, with marked good effect. It is an advantage in steamed potatoes to mix meal or bran with them. Pumpkins may be fed raw, if the seeds are taken out and thrown away. The seeds are injurious, unless cooked.

The Chairman stated that pumpkin seeds are sold by boys in the streets as nuts are here for food.

Dr. Trimble.—Pumpkin seeds are very injurious to ducks. I have seen whole flocks of ducks ruined by pumpkin seeds.

R. G. Pardee.—In Connecticut, in my boyhood, we used to feed pumpkins to cows, and I never heard of injury. For hogs, my father used to stew pumpkins, with good results. Pumpkins potatoes, and sometimes apples and a little corn made good pork.

Wm. S. Carpenter.—I feed pumpkins largely, and it increases the milk, and I have never discovered any injury from the seeds. I consider pumpkins very fattening for hogs when cooked.

BARK LICE.

Solon Robinson.—I have a letter from S. Armstrong, of Racine county, Wisconsin, who says:

"I wish to ask the Farmers' Club what I shall do to get rid of bark lice on apple trees, which are affecting nearly all the orchards in that part of the country. I noticed that orchards where there are hoed crops had much the most healthy appearance, yet more than half the orchards are in land seeded to grass.

"I wish to propose the following questions:

"First: Where the trees are partly cleared or have a stunted appearance, would you prune them pretty close?

"Second: How do you think it would do to dust ashes, lime or plaster on the limbs in the spring, before the leaves start, in a damp day when the limbs are sufficiently wet to make the dust adhere? Also, how would it do to dust on ashes or plaster in the summer when the branches are sufficiently wet?

"The orchard that I wish to try on is one that we have recently purchased, is seeded, and will soon be used up by the lice, if the cultivation is not changed and the lice removed."

Prof. Mapes.—The best thing in the world is to wash the trees with a saturated solution of sal soda. Heat one pound of sal soda red hot, and dissolve it in a gallon of water. Apply it with any sort of a mop or brush. This is the only thing that I have ever used that was an effectual remedy for bark lice and other insects.

Mr. Carpenter said a potash wash answered the same purpose on his trees—a pound of potash to one gallon of water. I have tried the sal soda, and prefer the potash wash.

Prof. Mapes.—I have frequently injured tender trees by potash, and I have never seen any harm from the sal soda. It won't injure the most tender plants.

Mr. Carpenter said that the potash does kill leaves, but does not hurt the boles or limbs of the trees.

SULPHUR FOR TREES.

Mr. Carpenter stated that a friend of his has received very beneficial results from the application of sulphur. Peach trees badly affected by the peach tree worm, were entirely cured by sulphur. The apple tree borers were also eradicated by a pint of sulphur to the root of a tree.

Dr. Trimble.—The peach worm is not a borer of the wood—it works under the bark. The apple tree borer works into the body of the tree, where it could not be reached by sulphur.

A NEW GRAIN MILL.

Prof. Mapes.—I want to speak of a new principle in grinding grain, lately invented. There is no rubbing process, as between the mill-stones. I have tried this new mill with various kinds of grain, and the effect is wonderful. The effect is produced by no rubbing or grinding, for there are no rubbing surfaces between which the grain can be ground. The grain is reduced to fineness, by the force of great speed of an armed wheel inside an iron case. The wheat is divested of the bran and separated from the flour. With five horse power, Prof. Mapes thinks more grain can be ground than with forty horse power, applied to burr stones, and that it will make more and better flour. The same mill grinds the hardest substances, such as gold quartz. The mills, as now about being made, will be sold at $300 each.

FISH BREEDING.

Mr. Adams presented a chart showing at a glance all the principal facts connected with artificial fish breeding; and also made a statement of fish breeding in France, very encouraging to those engaged in the business.

APPLES FROM PENNSYLVANIA.

John Buckholder, President of the Adams County Agricultural Society, Pa., sent some specimens of an excellent apple, common in that section of the State, which is not known here. It is a medium-sized, red-streak, roundish form, very white flesh, and delicious flavor, and is a good fall apple, and keeps well in winter.

Mr. Carpenter said this apple is unknown here, and I hope the gentleman will send us some scions, as I think it well worthy of cultivation.

The subject of the day, "Cultivation of flowers in rooms," was then taken up.

Mr. Cavanach.—Of what use is the cultivation of flowers, say some, it furnishes us neither meat nor drink? In answer to that question we will ask another, what is the use of anything? There are many things pleasing to the eyes, some of them expensive and not within reach of all, but flowers may, at a trifling cost, be possessed by the humblest individual. It has been said, by travelers, that they could distinguish the house of an amateur in flowers by the appearance of his garden, the house being covered with roses and honeysuckles, and the windows filled with choice plants; while that of the man who is so much engrossed with business that he cannot spare the time to cultivate a few flowers, presents a different appearance, there the weeds and briers grow in wild luxuriance. A few plants in the house are indispensable to the ladies, but as we frequently see them sickly, drawn up and covered with vermin, they give more pain than pleasure. It is a subject of no small difficulty to treat on the proper management of plants in rooms. Plants which are kept in rooms are such as generally require a temperature of from forty to fifty degrees; rooms at this season of the year are generally heated from sixty to seventy, which is from fifteen to twenty degrees higher than most plants need; if plants are kept where there is a fire, the windows should be allowed to remain open for a short time on fine days. Camelias ought never, when in flower, to be kept at a higher temperature than from forty to forty-five, they will stand

one or two degrees below freezing point without injury; there are some camelias which cannot be successfully cultivated in rooms; those which succeed best are, double-white, Fimbriata, Imbricata, Fordii and Sarah Frost; these will be found to give more satisfaction than any other kinds. Washing the leaves of camelias with a sponge will be found very beneficial in preventing the attacks of the red spider, which is one of the greatest pests that we have to contend with. Injudicious watering does more harm to plants than most people are aware of, some persons kill all with too much, others with too little, the best plan is to allow the soil to have a slight appearance of dryness, but not sufficient to cause the leaves to droop, then water moderately. Water should never be allowed to remain in the saucers. Some persons have an erroneous idea that the saucers should be filled with water, plants may grow and flourish for some time, but being so opposite to their nature causes premature decay. The next thing of importance is potting in suitable soil. Many persons imagine that all that is requisite is soil, let it be good or bad. We have seen plants potted in common street manure, the owners laboring under the impression that it was the very best kind for them because it was black. Unsuitable soil and large pots, generally given to small, weak plants for the purpose of causing them to grow, is, in nine cases out of ten, the cause of their death, we have seen plants, scarcely six inches in height, in pots large enough to contain a good sized orange tree, besides being filled to the brim with soil, and frequently watered with soap-suds, how can any person expect a plant to thrive under such treatment? as well might you expect a horse to grow fat, if fed upon corn-cobs, husks and cut straw, which some gentlemen maintain are excellent articles of diet. Giving small pots to weak plants encourages the growth of the roots towards the sides of the pot in search of air and moisture. In potting plants glazed pots should never be used, as they prevent the evaporation of all impurities, through the sides of the pots.

It has been thought by some that keeping plants in rooms is injurious to health. Plants absorb carbonic acid gas by the upper surface of the leaves, and give out oxygen by the under side, and in this manner purify the air as far as animal life is concerned. It does not appear that any exhalations of plants are injurious to human beings, as we find those who are con-

stantly occupied among plants generally enjoy uninterrupted health.

To have suitable compost for plants, the different soils should be mixed for some time before it is wanted for use; after it is mixed, it should be placed under cover until it is wanted. In making compost the following soils should be obtained, first, soil and turf from an old pasture; second, decomposed horse or cow manure; third, peat soil or leaf mould from the woods; fourth, white sand; fifth, coarse sand or gravel; sixth, charcoal and broken pots,—the broken pots and charcoal are for drainage. A suitable compost for fuchsias, roses and geraniums, consists of one part of white sand, one of leaf mould, and one of decomposed manure and turf mould. These should be well mixed together and sifted before using. A compost for cactus: sand, leaf and turf mould, with a good drainage of charcoal and broken pots.

Of all the insects which infest house plants, the green fly, red spider and mealy bug, are the most difficult to get rid of. They are easily destroyed in the greenhouse by tobacco smoke; for parlor plants, take a pail of soft water, cover the surface of the pot with paper to prevent the soil from falling out, and with a brush brush the leaves downward, dipping the plant in the water several times. The mealy bug may be found in the axils of the leaves of orange trees, camelias, passion flowers, and various other plants; they look like small specks of cotton, and are only to be got rid of by picking them off. If plants should happen to get frozen, they should be syringed with cold water, and screened from the rays of the sun. It frequently saves plants that would otherwise be destroyed. The culture of bulbous roots in the house, during winter, is very easy. They require to be kept near the light, and the pots or glasses turned frequently to prevent them growing out of shape. All bulbs, at a certain period of the year, are in a dormant state; the cultivator should lessen the supply of water, when the flowers wither and the leaves decay, and let the soil get perfectly dry, and remain so until the bulb is wanted for the next season.

Hyacinth bulbs intended to be grown in glasses should be placed in them in November, the glass being filled with water so that the bottom of the bulb barely touches the water; then place them in a dark closet for a few days, which promotes the growth of the roots more quickly than if at once exposed to the light. When the roots have commenced to grow, they may be

exposed to light and the rays of the sun as much as possible. The beauty of flowers depends upon their free exposure to air and light, because it consists in the richness of their colors, and their colors are only formed by the action of these two agents; flowers produced in a dark or shaded situation are generally imperfect and destitute of their habitual size and beauty. Narcissus and crocus also present a beautiful appearance in the parlor during winter.

All bulbous roots require a very rich soil, composed of equal parts of sea sand, rotten cow manure, peat soil and good turf mould. The Japan lily makes a beautiful display in the house; the variety called Speciosum, is the most beautiful variety of them all. It has a pink and white frosted ground, beautifully spotted with crimson. Lancifolium album is pure white. They require the same soil as hyacinths in pots. Their propagation is very simple, the bulbs may be separated, each scale making a bulb. The scales should be planted in pots containing silver sand, and placed in a cold frame, when well rooted they may be planted in beds in the garden.

Mr. Cavanach, in answer to several questions, gave some interesting statements about the treatment of plants brought into the house from the garden in winter. All roses and geraniums should be well trimmed of old wood when taken up. In taking plants out of the pot all that is necessary is to put the hand on top of the dirt and then turn the pot bottom up, and hit a gentle rap, and the ball of earth will slip out. Most people water plants too little. Two or three times a week is necessary, or oftener in a dry stove room. As for flower seeds, there is no certain reliance of getting the same sort, but the finer the flower the more likely it will be to produce its like from seed.

Mr. Pardee.—Great pains are taken by seed-growers in Europe to produce the very best sort of seeds, and these are sold at high prices. Our ordinary cheap flower-seeds are not to be relied upon. Benj. Bliss of Springfield, has obtained a very high name, as a seedsman, because the seeds that he has sent out have given great satisfaction. It is much better for those who wish to grow flowers, to pay the high price asked for seed by such a reliable florist, than to have poor ones for nothing.

Mr. Cavanach.—To grow flowers in the greatest perfection, gardeners often cover them, and take great pains to preserve them free from contact of insects or the pollen of other flowers.

THE IMPROVED TOMATO.

A letter from C. Edwards Lester, says:

I have grown the tomato, and watched its culture in many of the climates and countries of Europe and America, and I will furnish my little quota of observation and practical experience, hoping thereby to draw out valuable information from others. Everybody knows something of the value of the tomato as a fruit, and how we should miss it if it could be raised no more. But very few persons know how easily and abundantly it can be grown in perfection, how cheaply it can be preserved for future use in many forms, nor its invaluable medical properties as conducive to health and vitality. I will speak only on two or three of these points.

1. *The best kinds and varieties.*—Six years ago I began a more thorough system of experiments than I had ever practiced or seen. I prepared my bed for growing tomatoes, and the analysis of the soil corresponded very closely with the chemical components of the fruit. I then germinated ten or twelve of the finest varieties I had, or could get, and obtained large vigorous plants of the same kinds from our New York gardens. One of each was planted by itself, where it could not hybridize. In another bed I planted all the varieties together, to make them hybridize, and multiply new kinds.

I succeeded in getting one variety, which I found superior to any I had ever seen, in the following qualities: delicacy of flavor, thinness and smoothness of skin, fewness of seeds, solidity of meat, earliness of ripening, richness of color, evenness of size, and ease of culture. The next year I cast all other varieties away, and brought this to perfection; and it has been universally pronounced by agricultural fairs, farmers' clubs, and scientific horticulturists, to be superior to any other.

2. *My mode of culture.*—Germinate in a hot-house, hot-bed, or kitchen; for very early fruit, transplant when quite small into pots. The tomato improves by every transplanting, and each time should be set deeper. From the time four or six leaves appear, pinch or cut off the larger lower leaves and the terminal buds, and continue this process of pruning till the fruit is far advanced, so that when ripe the bed will seem to be covered by one mass of large, smooth, even-sized tomatoes, of the richest pomegranate color, and the leaves hidden by the fruit.

Set plants three or four feet apart, in the warmest spot you

have, and let them fall over to the northern frames twelve or fifteen inches high, or on pea brush, anything to sustain them, and keep the fruit from touching the ground, which delays ripening, creates mold, invites cut-worms, and always gives the tomatoes an earthy taste. Try for one cluster (the first that blossoms) and cut everything else gradually away. This will give you tomatoes in perfection, in the latitude of Buffalo, four or six weeks earlier than they are usually ripened in our climate. If you wish *late* tomatoes, pull up each plant by the root (just before the frost comes), and hang them up on the south side of a building, top down, with a blanket to roll up days and let fall nights. When ice makes, hang them up in any room that does not freeze, or in a dry cellar, and you will have fresh tomatoes all winter, somewhat shriveled but of fine flavor.

Having thus brought this tomato to comparative perfection, I wish to have the seed scattered as widely as possible, and therefore have left it at Mapes' agricultural warerooms in Nassau street.

Mr. Carpenter said that there has been an improvement made in France that goes ahead of Mr. Lester. The fruit grows upon a stout upright tree-like plant, that requires no support. It is expected that the seed of this new variety will be imported, and for sale the coming season.

Adjourned.

JOHN BRUCE, *Secretary pro tem.*

January 28, 1861.

Present—93 members. Mr. Andrew S. Fuller in the chair.

AN IMPROVED CABBAGE.

Mr. Burgess, of Long Island, showed a sample, and called the attention of the Club to the Winne Stadt cabbage, which grows somewhat in the shape of a pine apple, very solid, white, and sweet.

Mr. Burgess also showed two Long Island seedling apples, one of which was well approved by the fruit-growers present.

The Chairman said that the cabbage shown grows so hard that it is only good to cut up raw.

Mr. Burgess said that if the heads are cut up, they will then boil tender. To eat raw it is the best sort ever grown, and it

attains a large size; sometimes the heads weigh twenty-four pounds each.

The Chairman said it was one of the easiest varieties to head that has been cultivated in this vicinity.

R. G. Pardee.—I hear my friends speak of this as the best cabbage they have ever used. It is well worthy the attention of those who wish to plant seed the next season.

A NEW AGRICULTURAL MACHINE.

Bronson Murray introduced models of a new agricultural machine, invented by Prof. Turner, of Jacksonville, Illinois. It is a frame about six feet wide, fixed upon two broad wheels, which serve as rollers for the soil. This frame is arranged to carry two plows, when required for plowing, and at the same time drop corn or other seed. The plowshares can be removed and implements for cutting corn put in their place, by which the ground is cleaned and the dirt turned to or from the hills. There are knives that precede the cultivators and shave off all the weeds. There is a guard attached to the frame that covers the small corn so that it is never covered too much by the dirt. This machine is the result of ten years' experiment of the inventor, and he has proved that one hand can plant and cultivate sixty acres of corn on the western prairies. It costs $100, and requires two to four horses to work it.

A JAPANESS UMBRELLA.

Wm. S. Carpenter introduced, as a curiosity, a Japanese umbrella, which was much admired. When closed it more resembles a wooden club than anything else.

SOWS DESTROYING PIGS.

Solon Robinson read the following letter upon the above subject from William Manlius Smith, of Manlius, New York:

I have lately lost a fine litter of pigs a little over a fortnight old. As I might probably have saved two of them if the farmers to whom I applied for information had been in possession of it, I communicate the circumstance to you for the benefit of others in my situation.

On Tuesday night, at feeding time, the little pigs were doing well, apparently. Wednesday noon, all were missing but two. A very careful examination of the pen, bedding, &c., revealed no traces of blood, bones or hair. The two pigs were taken to the

house, and inquiry made of several farmers as to whether sows would eat their pigs at a fortnight old. The testimony being unanimous that they would not, it was concluded that the missing ones had been stolen, and the two were returned after a day's absence to the maternal bosom. About two days after these had also disappeared, but some traces of blood and fragments of skull showed the way that they and their fellows had gone. The sow had had plenty of food, having gained flesh during her suckling. Her diet was a pailful of pieces of mangel wurzel and a liberal allowance of soft corn in the ear, night and morning, and a pailful of good swill from the house at noon. The night that the first pigs went was very stormy and pretty cold, but the pigs were in a sheltered room and had a good bed. The night the last two went was also considerably colder than for a night or two preceding.

Mr. Veeder.—I have heard this attributed to the sow having too good a bed, that sows with very little bedding never eat their pigs.

Mr. Burgess said that he had suffered in this way in England, and yet he never gave much bedding.

Another gentleman said it was probably a want of animal food, and thought that if well fed with meat it would cure the evil.

WINTERING APPLES.

Wm. S. Carpenter said that he had found apples to keep remarkably well this winter. I have a number of barrels on hand that have been frozen hard, without injury. Some varieties injure more than others.

R. L. Pell.—It dont hurt apples to freeze if they are allowed to remain undisturbed till they thaw. Repeated freezing and thawing will destroy them.

Dr. Trimble.—If apples are put in cold water the frost is drawn out without injury to the fruit.

POTATOES FREEZING.

Mr. Carpenter said that potatoes may freeze in the ground and thaw without injury.

Some gentlemen stated that when potatoes or apples are accidentally frozen, the best way to recover them is to bury them in the earth below danger of further freezing, and there the frost is gradually drawn out.

Mr. Veeder stated that the two last years he had kept his

apples in an upper room with much better success than previously in the cellar. They will stand pretty hard freezing weather, if well packed in barrels.

HYBRIDIZATION.

This question, adopted at the last meeting, was now called up, and Mr. Carpenter gave his views upon the subject, and urged that all persons engaged in fruit culture should grow seedlings, and practice, as far as possible, the hybridization of fruits of all kinds.

R. G. Pardee.—We never should give up the chance of getting something still better than anything we have yet from seedlings. Hybridization is a great art, and its results are wonderful. Look at our superior flowers, all produced by this process. Then by taking pains with all our choice fruits and flowers, we may achieve wonders. Don't wait for chance seedlings, but practice hybridization in a scientific manner. One man can do but little. We need a great many men engaged in this work. The chance of seedling apples is that nearly all will be too poor to cultivate. The result will be very different if care is taken to hybridize the very best sort of apples.

Dr. Trimble asked the Chairman to give his views on the subject of hybridization.

Mr. Fuller submitted the following paper:

The word hybrid, when correctly used is only applied to the offspring of a mixture of two species. For instance, if we should take the native strawberry (Fragaria Virginiana) and the English strawberry (Fragaria Vesca), and by fertilizing one with the other produce a plant with the characteristics of both parents combined, we would then have a proper hybrid. But if we take the Hovey strawberry and fertilize it with the Wilson, the result would only be a cross between two varieties of the same species.

This we hold to be the correct view of the case, but custom, which sometimes becomes law, has broken down the barrier, and we now call a seedling plant a hybrid, whether it be the mixture of two varieties or two species. This is to be regretted, as true hybrids are forced productions, and not natural; consequently they are very rare, so much so that we have often thought that it could be said with propriety that *species* do not intermingle: and the few cases that we have on record of their having done so might be called exceptions, which are said to be necessary to every rule.

Plants in a state of nature perpetuate their species and varieties with great uniformity of character. Yet a slight change is very often observed, and it has been upon these variations that pomologists and florists have mainly depended, as the starting point from which they produce their innumerable varieties.

The effects produced by change of soil and climate upon plants, when removed from their native habitats, have long been observed, and these variations turned to valuable account. Although these changes have been slow, yet, to the aid of science and the preservation of them, we are indebted for most of the valuable fruits and flowers in cultivation.

When plants are removed from one country to another, and become acclimated, the effect of this change will sometimes show itself in the seedlings grown from them, in a distinct and wonderful manner, so much so, that we are often inclined to think that it is the result of accidental hybridization.

This leads many to believe that they have a hybrid variety, when it is only a variation produced by natural causes.

If we have a variety of fruit which reproduces its kind without variation, it is not positive proof that it is a distinct species; but it only goes to show that the natural forces of the plant are perfectly balanced.

When there has been a displacement of these forces, either by hybridization or cultivation, and the functions of generation have been disarranged, then variation begins, and the effects of hybridization the more difficult to determine.

Suppose we fertile the Isabella grape with the Sweetwater, and the result is a white variety, would the simple fact of its being white be a proof that the operation had been successful? No, not at all; for there have been plenty of white varieties produced from the Isabella, without its being brought in contact with any white kind.

To convince us that hybridization had actually taken place, we would want to see some of the prominent characteristics of both parents intermingled in the offspring.

Again, if the offspring should appear to be only a reproduction of the mother plant without variation, it would not prove that hybridization had not taken place; but it would only show that there was a prepotent power in the Isabella to reproduce itself, and the influence which the artificial fertilizing had produced was entirely hidden in the present generation of seedlings. But in

the next generation it might show itself distinctly without any effort on our part to bring about such a result.

A good plan of determining whether a plant is a true hybrid or a mixture of two *species* is to plant a quantity of its seeds; a portion of the seedlings thus produced will be pretty sure to show some of the characteristics of the original varieties; or, in other words, the mixture will again separate, and a part will breed back each to its original progenitor.

The Allen's Hybrid Grape is said to be a hybrid between the Vitis Labrusca and the Vitis Vinifera, two distinct species. By growing a quantity of seedlings from it we hope to prove that this is a fact, and if our position is correct, we will find a portion of them showing more of the Vitis Vinifera form than their parent, while others will show more of the Vitis Labrusca character.

These difficulties which we have mentioned of determining the cause that may have produced a certain change, ought not to check us in our efforts in hybridizing.

The world cares but little how a thing is produced, or where it is from, for the people are only interested in the results.

Our greatest danger lies in the fact that partial success will often direct our thoughts into a region of false theories, from which it is difficult to extricate ourselves without unlearning all that we have previously learned.

In all our efforts at hybridizing, the adaptation of the plants to the circumstances under which they are to be grown should engage our attention.

If it is our object to produce a plant for this latitude, we should avoid, if possible, crossing with a plant that is tender or otherwise unsuitable.

The aim in all of our operations should be to develop those qualities that are valuable and discourage those that are not, for these intercrossings will often produce an individual variety more valuable to us than either of the parents.

Again, you make take true superior varieties and cross them and the result will be a kind that is very inferior.

It is this uncertainty that makes the operation of hybridizing plants so fascinating. If we could see exactly what the results of our labor would be, it would rob it of half of its charms.

When Lady Holland introduced the dahlia into England, in 1804, suppose some enterprising artist had undertaken to make a

picture of what it would be in 1861, how near, think you, he would have approached it? He might have taken the rose tulip, the hollyhock, or any other flower of his day, and from these he might have pictured its future; but he would have never dreamed that the insignificant single dahlia before him would become in so short a time a flower the form of which is a true mathematical figure.

We have much at the present time to stimulate us to make extra exertions to produce new varieties of fruits. The desirable qualities of our fruits are distributed among too many varieties; and what we want now is, to bring these together and concentrate them in a less number.

We want the large size of the Union Village grape, the color of the Anna, and the rich vinous quality and hardy vine of the Delaware combined in one vine. The man who will produce such a variety (and it is possible to do it) will do his country a great favor, besides making a fortune for himself.

We want a pear as good as the Seckel, and as large as the Duchesse d'Angouleme. A Gravenstein apple that will keep at least three months longer, and not lose its flavor. A currant as large as the cherry, and as sweet as a raspberry. In fact, our wants are too numerous to mention.

Among the great perfections we have too many imperfections, and it remains with us to say whether these shall be multiplied or reduced.

There are a thousand chances that we shall descend in the scale to one that we will ascend, when we undertake to raise a new variety from seed; but that one chance was the foundation on which Knight, Van Mons, Vilmorin, and many others depended for their success when they produced the many fine fruits and flowers that we are now enjoying.

We hope every one who cultivates a fruit or flower will make an effort the coming season to produce some new and valuable variety by hybridization.

The seedling strawberries that I showed here last year were the results of very careful hybridization, and the result was that nine-tenths of the number were of fine size, as good as the original, but only one in a hundred as of superior flavor.

Solon Robinson called the attention of the club to the great results produced by the natural hybridization of Indian corn. What more might be done by careful and scientific hybridization

of corn? It is not impossible that this great staple crop could be more than doubled.

Mr. Burgess.—If all of our fruit seeds, which are now wasted, could be planted in hedge-rows and waste places, we should have a great increase of fruit, and occasionally a very rare new variety.

Dr. Trimble thought the world very much indebted to the bees, the greatest of all hybridizers. It is the bee that carries the pollen from one flower to another.

THE POULTRY QUESTION.

Wm. S. Carpenter.—This question has been upon our list of subjects some weeks. I have a few remarks upon the subject which may be interesting.

There are but few who are aware of the great importance of poultry to the inhabitants of the United States. It is estimated that there are annually raised and consumed for food in this country one hundred millions of fowls, affording a luxury for the table that could hardly be dispensed with. Admitting this estimate to be true, and that the stock preserved for layers is equal to one-half the amount raised, which would make fifty millions of hens; it is estimated that the production in eggs will average for each hen 75 cents, producing from eggs alone $37,500,000. One hundred millions of fowls for food, at 20 cents each, $20,000,000. making a total of $57,500,000. It can be proved that much better results may be obtained from hens than is shown in the above estimate. A good hen will lay, if provided with proper food, two hundred eggs in a year. Valued at one and a half cents each, this would show a result of $3 for each hen. A friend of mine, having a stock of 45 hens determined to keep a correct account of the number of eggs laid in a year; the result was 6,036 eggs, which is 134 for each hen; these sold for $90.54, beside raising 80 chickens; these hens consumed 56 bushels of mixed grain, costing 80 cents per bushel, besides vegetables from the garden and scraps of meat, that were valued at $10—making a total expense of $54.80, showing a net profit of $35.74. By experiment, it has been found that large companies of fowls do not do as well as a smaller number; fifty is found to be about the right number to produce the best results. It is said that fifty hens will produce more eggs than twice that number if they are allowed to run together. When a hundred hens are kept on the same farm, they should be divided into two companies. Great

loss is sustained by neglecting to furnish good warm apartments for the hennery, which should always front the south, and a portion of the front should be in glass to give plenty of light and warmth to the apartment by the rays of the sun. It is also important that the roost should be properly constructed; the best plan is to lay the poles similar to a flight of stairs, commencing about two feet from the floor and continuing them to the peak; the poles should be about two and a half inches in diameter, and always cut from the woods, and the bark left on.

Great care should be taken to eradicate lice from the hennery, they are destructive to a healthy condition of the fowls; when infested with lice they will not lay well, and these little pests often become so numerous that their attacks so exhaust the hens that many of them die. As a preventive in the hennery, the roosting poles should be well greased at the ends where they rest on the uprights; grease should frequently be put in these joints; the house should be thoroughly washed with lime, spring and fall; and a box four feet square and ten inches deep should always be provided for the hennery, and kept half full of wood ashes; this is highly necessary for winter, as they delight to wallow in this, and at the same time it will free them from lice.

Feed, and the manner of feeding, is another important consideration. A box should be provided for feed in the hennery, and should always contain something for them to eat; their feed should be varied; no one kind should be given them for more than a week at a time. The number of eggs depends much on the feed that is given them. It is only in winter that poultry needs our especial care. It is highly necessary that they be provided with meat and vegetables; nature does this for them in summer—the angle-worm and insects for their meat, and the grass for vegetable diet, is abundantly supplied. These are as necessary in winter as in summer, and should always be supplied, if we expect them to furnish us with eggs. For winter use a few cabbages should be stored for them, which they are very fond of, also onions and carrots are good; pigs' and sheeps' harslets may often be furnished on the farm. A very excellent article may be procured here from packing-houses called scrap cake, at a very cheap rate. With this attention, hens will lay as many eggs in winter as in summer.

It is said that two eggs furnish as much nutriment as a pound of beef. Eight eggs weigh one pound; a good hen will produce

her weight six times in eggs in one year. She does not lay as many the second year, and the third year nearly ceases laying; therefore, hens should not be kept more than one year on the farm for profit. Eggs should be set in March; the chickens will commence laying in August, and then all old hens should be sent to market.

Great improvements have been made in the size and quality of fowls within the last few years. The introduction of Shanghae fowls has done much to improve the size and quality of our native stock; but the pure Shanghae cannot be recommended as a profitable variety. I have a cross between the Shanghae and Leghorn, which is a great improvement. They are of fine size, great layers, and very superior for the table. There is a vast difference in fowls, as is known by every one who has paid any attention to the subject; while some are hardy and profitable, others scarcely pay their way under the most favorable circumstances and the best management possible. It is always a judicious plan for the farmer to keep a number of fowls of some kind on his premises, as there is always enough waste or spare matter to feed them; and, besides, they are serviceable in protecting the crops by destroying numerous insect depredators. To render poultry profitable, it is essential that great care should be exercised not only in the selection of valuable breeds, but in feeding and raising the young. If we are remiss in these points, no profit will result from the enterprise.

Mr. Trimble said that he was satisfied that there was no profit in keeping poultry except where they are kept in small numbers upon the farm.

Mr. Weaver of Fordham said that he had pretty fully proved that keeping poultry was profitable.

Mr. Doughty of New Jersey said that he was satisfied that poultry could not be profitably kept, except so far as to eat the scattered grain and bugs upon the farm.

Several other gentlemen spoke upon this question, and the weight of evidence was in favor of the profitableness of poultry.

Adjourned.

JOHN BRUCE, *Secretary, pro tem.*

February 4, 1861.

Present, 75 members. Wm. S. Carpenter in the chair.

PREMIUM FARM CROPS.

Judge Meigs sent in the following memorandum of some premium farm crops forty years ago:

At the fair at Ballston, Saratoga county, October, 1819, the premiums for the best farm were given to Mr. Earl Stimson, whose crops were as follows, viz:

Indian corn, $104\frac{1}{4}$ bushels per acre	$10
Barley, $60\frac{3}{4}$ bushels per acre	5
Spring wheat, 26 bushels and 6 quarts per acre	3
Potatoes, 714 bushels per acre	6
Beans, 40 bushels per acre	5
Grass, 3 tuns 3 cwt. per acre	4
Poultry, 250 fowls	3
Garden, 1 acre and 50 rods	5
One cabbage, $33\frac{1}{2}$ lbs.	--
Total	$41

SEEDLING APPLES.

The Rev. Wm. Weaver, of Fordham, exhibited some very fine looking apples for a name.

The Chairman stated that they resemble the golden reinnette, an English apple, and are like the golden pippin, a sweet apple grown in this country.

KEEPING APPLES IN OAT BRAN.

Mr. Weaver stated that these apples were kept in their present fine condition by packing them separately in oat bran.

HONOLULU SQUASH.

Mr. Weever presented seeds of the Honolulu squash for distribution. He considers it a valuable squash, and wants farmers to have the benefit of it.

The Chairman stated that this squash is excellent for pies, but rather too moist to eat as a vegetable.

APPLES—THE ESOPUS SPITZENBERG.

Robert L. Pell.—This apple originated in Ulster county, N. Y., and the apples now grown there are superior to those grown in any other locality.

The Chairman stated that there are two varieties of Spitzenbergs—one called the Flushing Spitzenberg. The Esopus variety is the highest flavored.

Dr. Trimble—This is a local fruit and grows better on the Hudson than anywhere else.

Mr. Burgess said they grew well in England.

Mr. Pell—I have sent some trees to England of the Esopus Spitzenberg, and also the Newtown Pippin.

The Chairman said that several varieties of apples cannot be grown to advantage on sandy soil. The best soil for an orchard is one that will grow good corn—that is, in this section of country.

Mr. R. G. Pardee—A rolling gravelly soil is the best for an orchard in this State.

Mr. R. L. Pell—No land can be said to be suitable for an orchard, no matter what its constituents may be, unless it is thoroughly underdrained.

SEA WEED AS A MANURE.

Mr. R. L. Pell—Made the following remarks on the value of sea weed as a manure.

The remarks made at the last meeting of this Club, respecting sea weed, and its value for agricultural purposes, would have led me to reply, had not matter of more apparent value consumed the time of the meeting.

Sea weed is much used on our sea coast as manure; being washed up by the waves, it is procured with little trouble and small expense.

Ribbon weed is one of the most common. It is long, narrow, and exceedingly green; four-fifths of it are pure water, and the balance carbonate of lime, carbonate of soda, phosphate of lime, magnesia, and silex. This weed may be melted down into a semi-liquid gelatinous mass, and is then known as kelp, and contains from three to five per cent. of soda, and is used for making glass. Barilla is now found superior, and kelp is less used for that purpose. Soda may be extracted from kelp by dissolving it in boiling water; one pound will produce six ounces, but it invariably contains chloride and sulphate of potassium and sodium, from which it is next to impossible to separate it.

Rock weed is exceedingly gelatinous, and consequently admirable for manure, and, being found, by all farmers who have made

use of it, very efficacious in increasing the fertility of their soils by the elements it converts into vegetable food, has become a favorite.

Eel grass is found in great quantities on the sea shore, but contains a large percentage of water, and is therefore little used comparatively speaking for manurial purposes.

Sea coral is sometimes cast upon the shore entangled with sea weeds, which much enhances their value, being composed of

Carbonate of lime	80
Animal matter	19
Phosphate of lime	1
Total	100

All these matters are used to the greatest advantage immediately after being taken from the sea shore, in the freshest state possible, while perfectly saturated with salt water; if that is permitted to drain from them, decomposition at once takes place, and their value is considerably diminished. In the wet, green state it will produce the same effects upon the soil that are derived from the use of marl and lime. It will not only add to the fertility of land already rich, but likewise much improve the poorest quality of soil. I once saw crops of rye, clover, turnips, potatoes and wheat, of incredible luxuriance, growing upon the English sea coast, by the use of this manure alone, on land too poor to raise white beans before receiving it. The farmers informed me that they used about one bushel to the rod, and that the ears of their grain were perfectly filled, and further, that it never fell. Its fat, unctuous substance ameliorates the soil, softens the sod by imbibing itself into it, and keeps the root and spongioles moist during the most terrific heats of summer. When manufactured into kelp, it requires twenty-five tons of sea weed to make one ton, which will then contain alkali, bromide of potassium, iodide of potassium, and sulphuret of potassium, all of which exert a wonderful influence on the growth of vegetables; but far less near the sea shore than they would on inland situations, because the saline matters they contain are carried with the spray of the ocean to great distances. When gales of wind blow strong over high and broken waves, sometimes it may be seen moving towards the interior in the form of a perfectly distinct mist, driving rapidly with the wind, and will traverse

leagues before it becomes completely deposited from the air. It is utterly impossible to calculate how much saline matter is thus spread over the soil of sea-girt land, rendering it capable of producing, sustaining, and finally yielding a luxuriant vegetation, fully developed in all its parts, and thus admirably prepared to build up the frames of all animals feeding upon it.

There is one point, however, connected with these saline matters that I cannot understand. It is well known that chlorine and iodine exist in large quantities, not only in the mist before spoken of, but in nearly all marine plants, and that both of them are not only poisonous to plants, but animals likewise. Chlorine possesses a pungent smell, and will burn phosphorus, gold leaf, and many metals. Animals cannot breathe it without suffocation. Every hundred pounds of salt contain sixty-two pounds of this substance. Iodine exists chiefly in combination with sodium, as iodide of sodium in marine plants and sea water. In the isles of Guernsey and Jersey sea weeds are considered of inestimable value, and have been used for manurial purposes from time immemorial. They are gathered from the rocks at certain times selected by the magistrate, and announced to the people by a public crier on a market day. There are two seasons for cutting it—in the summer and after the vernal equinox. That collected in summer is dried on the shore, and used as fuel, but the ashes is placed on the soil, and adds much to its improvement. The winter collections are spread on the green grass, and plowed under, with incredible advantage. There are many situations on our coast devoid of sea weed, still it may there be cultivated successfully for manure by merely placing stones on the shore for the fuci to attach themselves to, and in two years thereafter there will be a fine crop to cut.

The soluble saline parts of soils consist of gypsum, common salt, glauber salts, epsom salts, nitrates of lime, soda and potash, with traces of the chlorides of potassium, magnesium and calcium.

These are not, of course, all found in the same soil; one may contain lime, and be deficient in soda; another deficient in the phosphates, but well supplied with the magnesia. This accounts for the fact that one species of soil is admirable for the growth of certain plants, and not at all favorable to others; consequently, plants which require common salt, are always found growing near the ocean, or near salt works, hundreds of miles

from the sea, as they there meet with the conditions suited to their existence.

Plants that require the nitrates and ammonia follow man, as the domestic animals do, because they find where he is protection and food. Wheat, rye, corn and oats thrive where fully supplied with the phosphates, ammonia and magnesia, and these they can only obtain where men and animals congregate.

Saline matter, raised by evaporation from the sea, and carried into the atmosphere in very minute quantities, is still sufficient to furnish plants with the alkaline food they require, which may be shown by the fact, that a single grain in each pound of earth one foot deep, is more than equal to four hundred and ninety-five pounds in each acre—enough to supply cereal crops thirty-five years, if the straw is returned as manure. So the atmosphere, which only contains a thousandth part of its weight of carbonic acid gas, holds a sufficient quantity to supply all animated beings with all the carbon they require for ages to come. "Sea water contains 1-12400th of the weight of carbonate of lime, and this quantity, though scarcely appreciable in a pound, is the source from which myriads of marine mollusca and corals are supplied with materials for their habitations." All grass plants require silicate of potash. I examined last season the melted ashes of a haystack that was burned, and found large quantities.

If you have an over-cropped soil, that the excretions of the usually cultivated crops have rendered noxious and unfruitful, you may freshen it up, and neutralize the effects, as well as induce the decomposition of the excrementitious matters which all plants deposit, by a top-dressing of sea weed, which not only accelerates the decomposition of the many organic substances, but likewise leaves in the soil iron, alumina, lime, silica, magnesia, carbon, carbonic acid, sulphuretted hydrogen and sulphuric acid. Notwithstanding all that has been said in favor of sea weeds, kelp, &c., I am of the opinion that nearly the same effects may be produced in inland situations, where they cannot be readily obtained, by a mixture of ten bushels of salt and twenty bushels of lime, well incorporated together, and allowed to remain in a heap, covered with sods, for ninety days.

By this time decomposition takes place, and chloride of calcium and soda, the most deliquescing or moisture absorbing substances, are formed, which will produce a manifest improvement on any crop, not only readily supplying soda to it, but also act-

ing on other substances which the plants require, in such a manner as to render them soluble, and thus facilitate their entrance into the roots. We all know that the quality and quantity of the matters generated by the vital processes of any plant will vary sensibly, according to the proportion of the various varieties of food with which it is supplied. A plant comes to maturity on the most unfruitful and sterile soil, as well as the most fertile and luxuriant, the only difference between them being the size, number of branches, blossoms and fruit. The object of agriculture is to develope in the manner most advantageous certain qualities, and a maximum size in the organs of the plants we cultivate, and this can only be attained by the application of those manures which are indispensable to the development of those organs and the production of the quality desired. We must find out a system of agriculture which will enable us to give to each and every plant we grow that which is required by it to attain the object in view. If we desire a fine pliable straw for the purposes of making Leghorn hats, the mode of culture is entirely opposite to that which would induce the same straw to grow coarse, strong and stout enough to yield a maximum of grain. The fact is, we must necessarily proceed in the cultivation of plants in exactly the same manner that we do in growing animals. We know that the flesh of wild animals is naturally devoid of fat, and that we can produce it artificially to almost any degree. By the use of charcoal we may increase the liver of a goose to such an extent as to cause its death.

Land of the greatest fertility invariably contains disintegrated minerals with sand and argillaceous earths, in proportions so arranged as to give unlimited access to moisture and air. Such is the soil near Mount Vesuvius, in Italy, which is considered the type of fertile land. Nature indicates to us the requirements of plants at the commencement of the development of their first radical fibers and germs.

Bequerel has shown that the graminæ, leguminosæ, cruciferæ, umbelliferæ, coniferæ, and cucurbitacæ always emit acetic acid during germination. A plant which has just broken through the soil, and a leaf just burst open from the bud, furnish ashes by incineration, which contains as much and generally more of alkaline salts than at any period of their life, showing the advantage of sea-weed in the early stages of growth.

If two plants are grown beside each other, withdraw the same

food from the soil, they mutually injure each other. Therefore it is not wonderful that wild chamomile impedes the growth of corn, when it is remembered that both yield seven per cent. of ashes, which contain six-tenths of carbonate of potash.

Plants, on the other hand, will thrive next to each other when the matters necessary for their growth, which they imbibe from the soil, are of different kinds, or when they are not in the same stage of development at the same time.

On a soil, for instance, in which potash abounds, tobacco and wheat may be grown in succession, because the tobacco does not require the phosphates—which are indispensable to wheat—but the alkalies and food containing nitrogen.

According to the analysis of Possett and Riemann, 10,000 parts of the leaves of the tobacco plant contain only sixteen parts of phosphate of lime, eight parts of silica and no magnesia; while an equal quantity of wheat straw contains forty-seven parts, and the same quantity of the grain of wheat ninety-nine parts of the phosphates. This is a very considerable difference.

The roots of plants collect these alkalies from the rain which formed part of the sea water, as well as those of the water of springs, which penetrate the earth. Without alkalies and alkaline bases most plants could not live, and without plants the alkalies would gradually and surely disappear from the surface of the earth. When it is remembered that sea water contains one-millionth of its own weight of iodine, and that iodine in all its combinations with alkalies is soluble in water, some provision must exist in the organization of sea weed and fuci, by which they are enabled to extract iodine from sea water, and to assimilate it in such a remarkable manner, that it is not quite restored to the surrounding medium.

This family of plants are collectors of iodine, precisely as land plants are of alkalies, and they afford us this element in quantities that we could not otherwise obtain except by the evaporation of the whole ocean.

No man living knows what strength and height is allotted to any plant by nature. I have seen oaks grown by Chinese gardeners fourteen inches high, the whole habitus of which evinced an advanced age.

I was particularly struck with this fact a few years since, when a friend of mine presented me with some seeds of the Teltow turnip, which he purchased in a village of that name

near Berlin; they there grow in a poor, sandy soil, and very rarely weigh more than one ounce.

I sowed these seeds in a rich garden loam, affording them ample nourishment, and to my surprise they increased in weight to five pounds each; showing plainly that the size of all plants is proportioned by nature to the surface of the organs through which food is conveyed to them; every new fiber, spongiole, and leaf adds a mouth and a stomach to every plant.

When we supply more food than the organs of a plant require to develop it, the superfluity is not returned to the land, but is employed in the formation of new organs for the plant. At the side of a root already formed, another root is added, and a corresponding twig is developed. . Without an excess of nourishment, these new parts could not have been formed.

Each organ of a plant extracts from the food we present to it that which it requires for its sustenance, while that portion which is not assimilated separates as an excrement.

If we sprinkle the juice of the Phytolacca decandra upon a bed of white hyacinths, in two hours the blossoms will become red; this juice will enter into every portion of the plant, and will be cast out as excrement, unchanged in its chemical nature, without having been in the least degree injurious to the plant.

AERATING LAND.

Mr. Gale inquired whether under-draining would benefit land where there is no water to carry off.

Mr. Pell answered that it certainly would, as he had fully proved, that drains aerate the soil, and that is of great advantage.

Mr. Gale thought the great object is to get the soil in that condition which will admit the water to sink away from the surface, without being carried away from the land. It is then capable of being aerated.

NEVER PLANT NEW TREES IN OLD ORCHARDS.

Mr. Pell stated that young trees will never succeed if planted where an old orchard has decayed.

Andrew S. Fuller, of Brooklyn, thought this theory of excrementous matter in the soil injurious to new trees not tenable.

Doctor Trimble.—In the Dismal Swamp region there are immense cypress trees growing over the buried trunks of other cypress trees.

Mr. Gale.—I have seen pine forests cleared off and no pines

grew in again. Was that not caused by something in the soil detrimental to a new growth of the same sort of trees?

The Chairman said that, according to his experience, new apple trees do not succeed upon spots where old trees have decayed.

COTTON—ITS HISTORY AND CULTURE.

Andrew S. Fuller gave the following valuable information upon this question:

It has often been said that there was but one barrier between the people of Ireland and starvation, and that was the potato. And it is but a few years since that the truth of this saying came very near being verified.

The destruction of the grape in some parts of Europe caused much suffering among the poor of those countries. We find in history hundreds of cases where the prosperity or downfall of a nation can be traced to the success or failure of some humble plant.

Swift said that the man who succeeded in making two blades of grass grow where only one had grown before, merited a great name. Then, certainly, he who by introducing a new plant for food adds one more barrier between a people and starvation, should be honored above all others. The wise course of legislation which has been pursued by our government, along with that diversity of climate and soil which we possess, has aided and encouraged the people of this country to cultivate such a variety of crops that we may almost defy famine, while some other countries would tremble with fear at the prospect of a partial failure of a single variety of fruit or vegetable. It is this security against want that gives us strength, and makes foreign nations respect us.

The famine and financial troubles of European countries, that have been in many instances caused by the failure of some one plant, should teach us this lesson: that whenever a plant has become an important adjunct to the wealth and prosperity of a country, it becomes also a dangerous element, inasmuch as its loss would prove disastrous to those who depend upon its production for their support.

When an article has become thus important, there should be no delay in extending its cultivation over as wide an area of the country as possible, so that in case of its failing in one locality

there would be a sufficient quantity in another place to, partially at least, meet the demand. But it would be still better to introduce some other plant, of like character, that could take its place whenever circumstances require it. Wheat, corn, potatoes, and every other staple crop, should have a competitor ready to take their place in case of their failure in any one or more localities.

Cotton is one of those plants whose value, although known for thousands of years, was never fully appreciated or thought to be a necessity until within the last hundred years. The Greeks were acquainted with it, and they gave it the name of Gossypium, which is its botanical name at the present time. It is a native of East Indies, Egypt, Arabia, Syria, and most of the islands of the Mediterranean sea.

Theophrastus, who wrote some 350 years before the Christian era, says "that the Island of Tylus doth bring forth many trees that bear wool, which have leaves like those of the vine."

Pliny says "that the upper part of Egypt toward Arabia, bringeth forth a shrub which is called gossypium or zylon, and therefore the linen that is made from it is called zylinna. It is," said he, "the plant that beareth that wool wherewith the garments are made which the priests of Egypt do wear."

Although cotton was highly prized by the ancients, its cultivation, as a source of national wealth belongs entirely to modern times.

In 1594 the agent of Nicholas Lete, a merchant of London, sent him a quantity of the seed, which was sown and its cultivation attempted in England, but their cool climate was found to be unsuitable, and it was soon abandoned.

Gerarde, who wrote his great work, the Herbal, in 1597, says "that it was called bombaste, or cotton, and from its wool many kinds of commodities were made, such as fustian, bombaste, &c." The supply from which these articles were made was mainly derived from the East Indies, where it was but sparingly cultivated.

The great epoch in the cultivation of cotton commenced at the close of the revolutionary war in this country, although it had been cultivated in some gardens at the South several years before, and a small quantity was sent to Europe from South Carolina in 1754. But it was not until the revolution had cut off the supplies from foreign countries that necessity compelled the people of this country to grow their own materials for clothing. We may judge of the value of this article at that time

from the fact that it readily sold in Philadelphia, in 1787, for two shillings sterling per pound.

The progress made by individual enterprise soon attracted the attention of Congress, who, in their first reform tariff bill, laid a duty of three cents per pound on that brought from other countries; thus virtually acknowledging, and wisely too, the one great natural law of protection.

Whether it be the embryo of a great nation, a commercial enterprise, or the humble plant that springs from the earth, each and all must have protection in their infancy, or they perish.

If we may be allowed to digress from this subject we would say that it is our humble opinion that if the cultivation of silk had received the same encouragement and protection that has been extended to cotton, we should now have been as independent of China for silk as we are for their Nankin cotton. The invention of the cotton gin by Eli Whitney gave a new impetus to the cultivation of cotton, for by this simple machine three men, with the requisite power for propelling it, could prepare as much cotton for market as fifteen hundred men could in the ordinary way.

The increase in the production of cotton is shown in the following table:

In 1800, about	35,000,000	pounds.
In 1810, about	85,000,000	"
In 1820, about	160,000,000	"
In 1830, about	350,000,000	"
In 1840, about	790,479,257	"
In 1850, about	900,000,000	"

or two and a half millions of bales.

What the exact product of the next decade has been we have not yet learned; but we see by the press that there was shipped from New Orleans, on one day, the 21st day of January, 110,500 bales.

Although the value of the cotton crop is not as much as that of some other crops, yet, should it fail in this country, the effect would be severely felt, not only by us but by most of the European countries; for we produce two-thirds of the entire cotton crop of the world, so far as exports show.

The question now presented to us is how can we guard against the embarrassing circumstances in which a failure would place us; can its cultivation be extended further north, or shall we

look to some other country for a supply. Perhaps there is no plant that is affected more by change of climate and soil than cotton. The best cotton is produced where it is under the influence of a saline atmosphere, although a good quality is grown far inland.

That cotton can be grown in many of the Northern States is certain, but whether at a profit is yet to be determined. Besides, when it is removed from a warm to a colder latitude, the fiber often becomes very inferior. Yet we might in time remedy this defect by producing new varieties from the many species which are known to us at the present time.

The Arboreum, or Tree Cotton, grows to a shrub or tree from twelve to eighteen feet in height, and is a native of the East Indies, and is quite tender. There are some five or six species that are herbaceous plants, two that are deciduous shrubs and one that is an evergreen shrub, beside many other sub-species and varieties. From some of these it is quite possible a variety might be grown that would succeed here. But it is doubtful whether labor will ever become so cheap in this section of the country as to admit of its being cultivated.

Dr. Trimble.—You may talk about cotton being king, but the truth is that the caterpillar is much more king, for it has threatened to annihilate the cultivation of cotton. Again, the silk-producing caterpillar is much more a king than cotton.

R. G. Pardee.—If the best late information published be true, then China is far ahead of the United States in the amount of cotton produced. It is all a fallacy that the world is dependent upon this country for cotton. It can be produced in several other countries to any extent desired. It is only because it has been produced here cheaper than in other countries that we have the lead.

Dr. Trimble said that some of the Egyptian mummies were wrapped in well-woven cotton 3,000 years ago. This proves that it can be and has been grown in Egypt a long time.

Wm. Lawton contended that cotton is king in this country, and seems to think it must continue to rule, unless people can be induced to give up dogs and grow sheep, which farmers cannot do unless the dogs are destroyed..

Dr. Trimble.—The great secret about cotton is that, by our Southern system of labor, we have been able to furnish cotton cheaper than any other country; it is not because it cannot be

grown in other places. But here, with cheap land and cheap labor, the supply has been kept up at low prices Unfortunately, the planters are wearing out the cotton lands with as great rapidity as the tobacco planters wore out their soil. Many plantations that once produced cotton are now barren.

R. G. Pardee.—One of the most important features of the present times, we may say of the century, is the application of a new fibre to the same purposes as cotton is now used. This is the manufacture of a fibre termed Fibrilia, by Mr. Stephen A. Allen, of Boston.

That gentleman, after repeated experiments, has succeeded in producing from ordinary Canadian flax, a material which he terms flax cotton. The fibre so closely resembles that of ordinary cotton that the most practiced judges can scarcely distinguish between the one and the other. The calico produced from it is pronounced much finer and better than that manufactured from the best of cotton, and takes a better finish and brighter and more permanent colors. The Fibrilia mixes with either cotton, wool, or silk, and adds to the strength of either, whilst its price is only equal to that of ordinary cotton. We understand that the first experiments in the machinery intended for its manufacture have proved quite satisfactory, and arrangements are being made for bringing it into immediate consumption in different parts of New England and the West. Mr. Allen in an address before the Massachusetts Legislature, thus remarks on the preparation of this raw material: "When the flax is nearly ripe in the field, it may be cut with an ordinary scythe or mowing machine, and be cured like hay. The seed may be threshed by an ordinary threshing machine, as it does not injure the fibre for our purpose by becoming tangled. It should then be broken and scutched by Randall's machines and the lint thus saved, which has been reduced to a uniform staple, may be baled and sent to the factory. A brake and scutcher may be turned with much less power than an ordinary threshing machine, and one of each should be owned in every neighborhood where flax is raised to any extent. The seed will average from fifteen to twenty bushels per acre. The lint or tow yields, for unrotted straw, from 500 to 1000 pounds per acre, and is worth for making fibrilia or flax cotton, when properly cleaned, from two to four cents per pound. Farmers at the West now raise, (where they raise any) for the seed alone, feeding the straw to the cattle, or throwing it

away. If the production of the seed will pay the agriculturist for raising the flax, the saving of the fibre will make it one of the most reliable crops in the country. When the straw is broken in the manner before described, the shore or woody part remaining, becomes a valuable food for farm stock. The seed will, of course, be sold to the oil mills, but the oil cake should be retained for consumption on the farm.

We have seen specimens of bleached *Fibrilia*, which demonstrate qualities fully equal to those of Sea Island cotton. We think none will doubt the feasibility of the plan suggested by Mr. Allen.

Colonel Lander, who has just returned from California, states that in his surveys across the Rocky Mountains he saw millions of tons of wild flax and hemp, that could be used for manufacturing purposes, and the Indians of the plains now use the fiber for many purposes in their own domestic economy.

The following is a list of plants more or less valuable for making fibrilia,. flax cotton and paper stock: The banana, nettle, palm leaves, ferns, stalks of beans, peas, hops, buckwheat, potatoes, heather, the straws of the cereals (if taken green) many grasses and sedges, common rushes, leaves which cover the ears of Indian corn, the pita or great aloe, pine-apple, wild rhue, thistle, wild indigo, hollyhock, mallow, althea, black and white mulberry, yellow willow, sugar cane, grape vine and American paparas.

WOOL VS. COTTON.

Solon Robinson called the attention of the club to the fact that wool was of vastly more importance to the great mass of people of the United States than cotton. He said, we can do without cotton, but we cannot do without wool. Look at our clothing—one little lock of cotton makes our shirt, while every other garment is made of wool, from head to foot. And for this one garment we can substitute other fabrics, such as silk, linen or light woolen cloths, but to protect us from the inclemency of our climate we must have wool. So it was agreed that wool, cotton and corn should be the subjects for discussion at the next meeting.

FREE GRAFTS.

Wm. S. Carpenter offers to distribute apple and pear grafts of all kinds recommended by the committee on choice fruits, com-

mencing next week with two of each kind, and continuing the distribution every week. Those who want choice grafts will do well to attend the future winter meetings.

Subject for the next meeting, "Cotton, Wool and Corn."

Adjourned.

JOHN BRUCE, *Secretary pro tem.*

February 11, 1861.

Present, 110 members. Robert L. Pell in the chair.

The Secretary sent the following extracts.

[London Farmers' Magazine, January, 1861.]

ITALIAN RYE GRASS

Is more strenuously recommended than ever, especially for superior nutrition, but it does not thrive without much moisture and especially liquid manure.

NEW EDIBLE ROOTS.

Root of our common caraway is used like parsnip. Root of the water plantain "*sagittaria sagittifolia*," is as good as *arrow root*. The Chinese and Japanese are fond of it. They cultivate it. Mexicans make good flour out of *cacomite bulbs*, a *Tigris*. Many of the caladiums and arums are used in southern Europe.

The Paris Academy of Science recommends the *shicarra*, newly come from New Grenada; grows three feet high, is rich in sugar, *stands cold well.*

Barley root is well known as edible. The *ocar* of South America is valuable: gives small potato-like tubers. Cultivated in Bolivia and Peru. These tubers on long exposure to the sun become like *figs and are called carri.*

Lady Countess Chesterfield's figs take prizes frequently.

JANUARY MARKETS.

Best butter about 30 cents per lb.; beef, 18 cents per lb.; best potatoes, $1 per 100 lbs.

The Journal of Agriculture, Scotland, January, 1861, one of the best published anywhere, has the following:

THE TURNIP FLY. "*Haltica Nemorun.*"

The Rev. James Duncan gives a very valuable set of experiments on preventives and remedies (a *prize essay* and took the *gold medal*) he faithfully tried. This leaping little beetle does

not prefer eating turnips, it likes wild radish, mustard and some others. From these and the plants around the field they are always ready to meet the young turnip, and so quickly that it was supposed that they were in the soil.

No specific remedy has yet been discovered. I have tried all things: coating the turnip seed with oil, sulphur, steeped in strongest brine, in assafœtida, soot, a mixture of soot, salt, lime, and assafœtida used as a top dressing. A sprinkling of road dust has proved good. I used a mixture of road dust, lime and sulphur, gas lime and soot. I am obliged to recommend great plenty of seed and a rich soil. I believe that I have narrowed the field of enquiry.

The oyster plant was highly recommended by the Rev. Mr. Weaver, of Fordham, but he thought it a slander on the oyster to compare it with food made of this plant.

PLANT-LICE.

Dr. Trimble.—The English Parliament do not consider this subject beneath their notice, and have appointed committees to investigate the subject. From the best evidence that could be obtained it was shown that there is no remedy that will prove effectual for their destruction. The only practicable thing appeared to be manual labor to search for and crush the eggs. Ants are the greatest friends of plant-lice, for they feed upon a sweet substance secreted by the lice. At the first appearance of plant-lice is the time to commence their destruction. If allowed to multiply once or twice, their numbers become so great that there is no power known to us that will rid the plants of them.

Wm. Lawton recommended the fumigation of plants by tobacco to rid them of lice.

THE LOCUSTS.

Dr. Trimble thinks that the locusts do not lie dormant in the earth seventeen years, but live and feed upon the roots of trees, and that it is this feeding that has drawn the sustenance from fruit trees, so as to render them partially barren. Last year the locusts were above ground, and did not feed on the roots, and we had a good crop.

John G. Bergen objected to this theory, as it is not applicable to Long Island, where fruit has often failed, and the locusts have never been known there.

A SUBSTITUTE FOR WHEAT.

Solon Robinson read the following letter from C. W. Carpenter, of Mt. Gilead, Ohio:

From an article in *the Weekly Tribune* of Jan. 26, it is clearly established that the wheat crop east of Illinois is gradually diminishing, while the prairie soils west and northwest must finally cease to yield remunerating crops, and I add, must always be uncertain, owing to the unprotection of the country from the fierceness and intensity of climatic changes. The population doubles in ratio every twenty years; and the production of wheat does not begin to keep pace with the demand, notwithstanding the opening of millions of acres of new land annually. It is useless to talk of resuscitating old lands with expensive manures, while we can raise wheat on new lands so much cheaper without manures. Then what shall we eventually do? Draw the supply from abroad? this, if practicable, would be ruinous. At any rate it is desirable to begin to look about us for some better substitute than rye or corn, which is a more certain and profitable crop than wheat. Now comes the gist of the whole matter: Some four or five years ago, the Hon. John Sherman sent me a small package marked "Spring Barley from Italy." I raised it two years, and then let my neighbor, D. C. Bingham, have it to experiment with; this year he has raised 36 bushels; it weighs over 60 lbs. to the bushel; has no husk like the common barley, but is smooth like wheat; it must be sown very early in the spring, and I think it is as certain, and will yield as well as oats—certainly better than rye or wheat; it has always been sown very thin on the ground, in order to increase it as fast as possible. It makes as white, nice flour, and white and as light bread as wheat; it cannot be distinguished from wheat bread only it is sweeter and more palatable. It is certainly the best substitute for wheat known, and I look for the time when it will be pretty generally substituted for wheat, particularly where wheat cannot be profitably grown. If this information shall benefit the future bread-eating and fire-eating population of this country, as I certainly believe it will, they are thrice welcome.

C. W. CARPENTER,

Mount Gilead, Ohio.

Mr. Fuller said that the same grain was grown in Western New York over twenty years ago, and was much liked; but why its culture was not kept up he could not say.

Several other gentlemen thought the wheat crop was in no danger of failing.

STATISTICS OF COTTON GROWING—THE PRODUCT PER ACRE AND PER HAND.

Solon Robinson.—About ten years ago, I traveled extensively in the cotton-growing States, and made memorandums, from statements of planters, of the products of their plantations. To show how much cotton, of the common or upland variety, is made per acre and per hand, I have copied the following items, which will show the product in several sections and upon various kinds of soil, in Georgia and South Carolina.

J. E. Hurt's plantation is on the Alabama side of the Chattahoochie river, 27 miles below Columbus. He works forty to fifty hands, and averages five bales of 500 pounds each to the hand, and makes 30,000 pounds of bacon a year more than is wanted on the plantation, and all the corn he requires for plantation use.

Neighboring planters make more cotton, but have to buy corn and meat. Some who don't make much corn make seven or eight bales to the hand.

John Wolfolk's plantation is eight miles below Columbus. He owns 8,000 acres—some of it the richest kind of bottom land, such as will produce 1,000 to 1,500 pounds of cotton per acre. He has made 3,000 pounds per acre, and 30 to 50 bushels of corn on similar land. His land is valued at $30 an acre. The bottom land is overflowed by high floods. He plows his ground with one mule. Land in the vicinity not as good as this rents for $2.50 an acre. These bottoms are known as "isinglass land," and are considered the best of any, as the soil is never too wet, and seldom suffers from drouth.

Gen. Abercrombie, on the opposite side of the river from Col. Wolfolk, has frequently made 50 bushels of corn per acre, and on same sort of land 2,500 pounds of cotton. He uses a subsoil plow, and plants corn in beds four feet apart, reversing the beds for the next year. Cotton is planted in beds five to six feet apart. His average yield is 1,000 pounds per acre, and four bags per hand, and average price six cents a pound. Usually plants 300 acres of cotton, and 250 acres of corn per annum. Keeps a large stock of cattle, but doubts the profitableness of it, and thinks his meat costs him more than it would to grow and sell cotton and buy meat. He works 40 hands, all told, equal to 30 full hands, and averages 15 or 16 acres to the hand.

Judge Mitchell, 30 miles below Columbus, says his cotton crops average 2,100 pounds to the acre, on creek bottom lands, working 44 to 50 hands, and makes all his corn and pork, and says this is a full average for this section of the country.

The following entry is under date Madison, Ga., March 12: Corn is now planting; the distance is usually three and a half by four feet, one stalk in a hill, or two stalks four by five feet apart. Cotton is planted three by four feet the first of April, and the average yield 600 pounds per acre. This is an upland granitic region.

At Greensboro, Ga., on similar soil, Dr. Poulain, an intelligent planter, says, the average yield of corn per acre, in this county, is about 12 bushels, and cotton 500 lbs. per acre, and 3 bales per hand, with all the provisions made upon the plantation. A good set of hands will cultivate eight acres of cotton and eight acres of corn each. In 1849, the Doctor made on the Oconee bottom 1,300 lbs., per acre to all that was planted, and averaged six bales per hand, and all the provisions. His land averaged thirty bushels of corn per acre. A neighbor made eight bales and forty lbs. per hand in one year, but had to hire extra hands to pick the crop. Corn is planted from the 1st to the 15th of March, and cotton from the 1st to the 15th of April, and nearly all the plowing in the county is done with a small one horse plow. Some of the old abandoned fields recently taken up and manured produced 1,000 pounds of cotton per acre. A planter says three to four bales per hand is a good average, and fifteen acres per hand, half corn and half cotton, is a fair allowance; and that the average corn crop is less than fifteen bushels per acre, and the average cotton crop 500 pounds.

The natural growth of upland timber in this region appears to be oak, hickory, and short-leaf pine. On the bottom lands there are poplars, lynn, &c. The soil is generally, a granitic clay.

At Athens, I met with a planter who insists that what is working the ruin of that country, and will entirely ruin it if persisted in, is cast iron plows. The reason is, they work too deep.

In the vicinity of Athens, the average upland crop of cotton is given as 800 pounds, upon a well managed plantation, for a series of ten years. The average of the county at 400 pounds per acre of all the cotton land cultivated. Corn averages ten bushels an acre; oats about five bushels, or 500 pounds, straw and all.

On the South Carolina side of the Savannah river, fifteen miles

below Augusta, is the plantation of Ex-Gov. Hammond. His bottom land is a sandy loam, and his upland almost wholly sand, which does not yield an average of ten bushels of corn per acre. That is considered a good yield in a good year in that vicinity. He plants corn three by four feet apart, one stalk in a hill. Cotton is planted one and a quarter by four feet apart, or rather it is thinned to a stand at that, and yields an average of 400 pounds per acre, and twenty acres is a common crop for each hand, or, what is more common, ten acres of cotton, and ten acres of corn.

Gov. Hammond has dressed all his upland with a heavy coat of shell marl. He plows with small one mule plows, and as he has 3,000 acres in cultivation, of course he cannot manure except by foreign substances, such as marl, guano, superphosphate, &c., but he finds great benefit from a pea crop, grown for a fertilizer among corn.

His greatest crops he has obtained from cypress swamps, drained by immense open ditches, at an expense, beside clearing, of $5 an acre. The swamp land averaged about 750 pounds per acre. One acre gave 1,788 pounds. The swamp has to be cultivated entirely by hoes.

This plantation covers 10,000 acres, much of it not worth clearing for cultivation, it being, like a large portion of the State, a barren sand, covered with long-leaf pine forest. There are 220 slaves on the place, 137 of which are on the list of work hands.

The cost of clearing and draining the swamps is based upon the quantity of cotton the same hands could have made in the same time upon the old fields. The estimate is as follows: Clearing, $25 an acre; ditching, $5; marling, $10. The previous salable value of the land is not over $3 an acre. About 600 acres have been drained, by over forty miles of ditching, from three to thirteen feet deep.

The weekly rations of full-grown slaves upon this plantation are two pounds of bacon and one pint of molasses, or three pounds of bacon without molasses, and one peck of corn meal. No vegetables are dealt out, but, as the slaves work task work, they get time to grow some potatoes, turnips, and peanuts in their own gardens.

About ten miles west of Columbia, S. C., I saw a newly-cleared field planted with corn, the owner of which told me that it would yield about five bushels of corn per acre, for two or three years, and after that not over one or two bushels without manure. The

principal timber is long-leaf pine, with an undergrowth of scrubby black oaks, persimmons, black gums, and sassafras, and the land clean white sand. Not one-eighth of the area is cultivated, and this is the character of a vast portion of the middle region of North and South Carolina and Georgia.

Five miles south-east of Columbia lies the great plantation of Col. Wade Hampton, a considerable portion of which is upon the bottom lands of the Congaree, and the first level above, and it yields, by fertilizing with manure and peas, five out of seven years; 40 bushels of corn per acre, or 800 pounds of cotton. There are 12,500 acres of land in this plantation, 10,000 of which are timber, and much of it not worth clearing. Of the 2,500 cultivated, I found 750 acres devoted to cotton; 400 acres to corn; 200 acres to oats; and a small portion of the balance in vegetable crops, and the other resting or in pasture. I found here a fine flock of 400 sheep, which would be largely and profitably increased but for the same pest that infests the North—that is, dogs. The regular average allowance of every mean negro is five, and every mean white man six, worthless curs. This plantation has 300 slaves, and does not make sufficient meat, owing to the fact that the neighbors' negroes love young pigs.

The method of planting corn is to plow a bed of five furrows with a 16-inch shovel plow, and then plant in drills four and a half feet apart, leaving two stalks two to three feet apart in the drills, and the average yield is 40 bushels an acre. In cultivating corn, the first operation is to "bar off," and then to "break out the middles"—that is, plow the land between the beds.

Cotton is planted April 1 to 15, in drills four to four and a half feet apart, according to quality of land, and thinned to a stand fourteen inches apart in the drills. Ten acres per hand is the allotment. Three cotton gins and a press on this plantation are driven by water.

A plantation, owned by Col. Hampton, situated on the Mississippi bottoms above Vicksburg, and conducted by his son, with 180 slaves taken from the home plantation, yielded, in 1847, 747 bales upon 700 acres planted in cotton and corn. The general average there is 1,200 pounds of cotton per acre, or 80 or 90 bushels of corn.

Five miles below Camden, S. C,, on the Wateree, is the home plantation of Col. James Chesnut, 15,000 acres in one body, with 400 slaves. He plants 1,000 acres in cotton, 600 acres in corn,

200 acres in oats, 200 acres miscellaneous. The average yield of cotton is about 800 pounds per acre, and of corn about 25 bushels, though some of the land will average 50 bushels, and some has made 80 bushels per acre in favorable seasons with manure. Corn stalks are plowed under; formerly it was the practice to burn them, and everything else that would burn on the land.

April 26, cotton was planting, and corn had been up and killed down by frost and snow the 15th of April.

Mr. Boykin's plantation, adjoining Col. Chesnut's, down the Wateree, has 140 slaves, and not over 45 of them field hands, and has about 2,000 acres in cultivation on the river bottom and adjoining upland, and is worked on the system of use and rest; has 300 acres in cotton, which yields 800 pounds per acre and about six bales per hand; he plants about 150 acres of corn, which averages 20 bushels per acre; sows plenty of oats and some wheat, and made last year 24,000 pounds of pork. The allotment per hand is ten acres of cotton and corn. Plants cotton in beds 3½ feet apart upon high land, and 5 feet upon bottom land. Corn is planted on high land 3½ by 5 feet apart, one stalk in a hill, and in drills 5 feet apart on low land. The corn land is manured with yard manure, made by cattle droppings and pine leaves. The soil of the low land is clayey loam, and some of the upland is stiff clay, running into sand as it recedes from the river. Cotton land that ordinarily produced 500 pounds per acre was made to produce 2,400 to 2,650 pounds per acre in a series of eight years by the use of manure, and 100 bushels of corn and 15 bushels of peas per acre have been made by manuring upon land that ordinarily made but 20 bushels of corn without manure.

The rations on this plantation are 3½ pounds of bacon per week, and all the corn meal the hands will eat, with occasional fresh meat and vegetables extra.

On Col. Nettle's plantation, on the journey eastward from the one above, his overseer told me that, by an improved system of cultivation, he had raised the production of cotton from 40 bales in 1846 to 91 bales in 1847, and 184 bales in 1848, working 35 field hands, and had made all the corn and meat needed on the place. Part of the land is quite stiff and part of it sandy, and will not average over 400 pounds per acre of cotton in the seed, or 5 bushels of corn without manure. Corn with manure averages 12 bushels, planted 4½ by 4½ feet, one stalk in a hill. Cotton is planted in beds 3½ feet apart, and stalks left 4 or 5 inches apart

in the row. One hand can tend 21 acres of cotton and 9 acres of corn. On another place 21 hands made 139 bags, not quite 400 pounds each. A commercial bale of cotton is 400 pounds. A South Carolina bag of cotton is 300 pounds.

Col. Williams of Society Hill., S. C., owns 366 slaves, and a large plantation and cotton factory and tannery, &c. He works 140 field hands, and plants 7 acres of corn per hand. The cotton averaged, the previous year, upon 1,130 acres, 1,000 pounds in the seed per acre; and the corn, on 630 acres, 25 bushels per acre. The cotton crop averaged six bales per hand.

Cotton is planted in beds 4½ feet apart, and left to stand 12 to 18 inches apart in the rows. Corn is planted 4½ by 5 feet, two stalks in a hill.

The following was the cost of making 331,136 pounds of cotton, packed in 796 bales, averaging 416 pounds each:

3,980 y'ds of Dundee bag'ng (5 y'ds to a bale) at 16c.	$636 80
3,184 pounds of rope at 6c. (4 pounds to a bale)	191 04
Taxes on 254 plantation negroes at 76 cents	193 04
Taxes on 4,200 acres of land, valued at $15 an acre	70 00
Wages of three overseers	900 00
Doctor's bill and medicine, on contract at $1.25 a head,	317 50
Iron for blacksmith shop	100 00
Cloth from his own factory	810 00
200 pairs of shoes from his own factory, at 87½c	175 00
100 oilcloth capotes	125 00
20 woolen blankets, given one at each birth	25 00
Calico dress and handkerchief, one to give to each woman	82 00
Christmas presents, given in lieu of allowing slaves to grow a crop	175 00
Annual average outlay for iron and wood work of carts and wagons	100 00
50 sacks of salt	80 00
1 ton of plaster	7 00
100 barrels of lime	187 00
Annual average expense of repairs of gins and belts	80 00
400 gallons of molasses	100 00
3 kegs of tobacco	60 00
2 barrels of flour	10 00
Freight and commission, ⅝c per pound on cotton	2,069 60
Carried forward	$6,791 48

Brought forward	$6,791 48
To this add interest at 7 per cent on valuation:	
$63,000 for land	4,410 00
$88,900 for slaves	6,228 00
$3,720 for mules, &c	260 00
$2,000 for cattle	140 00
$1,000 for hogs	70 00
Total	$17,394 48

Sales of produce of the plantation:

331,136 pounds cotton at 7c	$23,179 52
13,500 pounds bacon at 5c	675 00
Beef and butter	500 00
100 bushels of corn	50 00
1,000 bushels of corn meal	500 00
80 cords of tan bark at $6	480 00
Blacksmith work	100 00
Mutton and wool	125 00
Total	$25,509 52

This gives a profit of $7,615.04.

Col. Williams owns 10,000 acres of land, but only estimates in the above calculation what belongs to the cotton plantation. The following are the estimated values:

4,200 acres of land at $15	$63,000 00
254 slaves at $350	89,900 00
60 mules and mares, and 1 jack and 1 stallion, at $60	3,720 00
200 cattle	2,000 00
500 hogs	1,000 00
23 carts and 6 wagons	520 00
Plows—60 bull-tongue, 60 shaving, 25 turning, 15 drill-plows, and 15 harrows	262 00
All other tools	1,000 00
Total	$161,402 00

Annual bill of clothing per head:

12 yards of cotton cloth at 6¼ cents, for 3 shirts and 1 pair of pants	$0 75
6 yards winter cloth at 40 cents	2 40
1 pair shoes, and repairing	1 00

1 oil-cloth capote	$1 25
A bed comforter, biennially	63
1 blanket	1 25
1 wool hat	50
Total	$7 78

Annual bill of cost of feeding slaves (where full fed as upon the plantation of Col. Williams, and other first class planters):

3½ pounds of bacon a week is 182 lbs, at 5 cents per lb	$9 10
1 peck of meal per week is 13 bushels, at 50 cents	6 50
Molasses, about 1 6-10 gallons	40
Tobacco and salt	28
Potatoes, and all other vegetables, estimated	9 72
Total	$26 00

Or 50 cents a week.

Upon most plantations the three last items would not be estimated, as the slave would have to provide his own tobacco, salt, molasses, potatoes and other vegetables, out of his own crop, which he is allowed to cultivate Sundays and moonshiny nights, or from the sale of eggs, chickens, brooms, meats, coon skins, and other merchandize.

In another paper, if desired, I can give similar statistics of cotton, sugar and rice plantations in other States, and of southern cotton manufactories.

In all the estimates of number of pounds of cotton per acre, I believe the calculation is made upon the crop in the seed, and it is generally estimated that 1,000 pounds of seed cotton will give 290 or 300 pounds of ginned cotton, and about thirty bushels of seed.

NEW VARIETIES OF CORN.

Wm. L. Carpenter showed twenty-six varieties of corn, several of which were produced by himself by crossing some of the best varieties. Stowel's evergreen sweet corn will grow five or six ears to the stalk, but it is not as good as the excelsior. A dwarf sugar corn grows only eighteen inches high, matures in fifty days. As a general crop the excelsior is the most valuable of any variety of sweet corn. It is estimated that several hundred tons of green corn are consumed annually in this city, and it is highly esteemed for food by all classes.

CORN STALKS FOR FODDER.

Mr. Carpenter spoke highly of stalks for cattle feed, and urged farmers to cut them in a chaffing machine. He has wintered his milk cows and work oxen on cut stalks alone, and they are now in very fine condition.

VARIETIES OF CORN RECOMMENDED FOR GROWTH HEREABOUT.

For field crops.—Dutton, R. I. Premium, King Philip, King Philip improved, Prolific Golden Drop, Improved Crystal Flint.

For eating green.—Early Burlington, Tuscarora, Darling's Early Sugar, Excelsior Sugar Cane, Stowell's Evergreen.

CORN FOR DISTILLATION.

Mr. Henry stated that a few years ago about two-fifths of the corn crop brought to the seaboard was consumed by the distilleries, and that the hardest flint corn gave the smallest yield of spirit.

EARLY TABLE CORN.

Mr. Gale stated that by selecting the earliest ripening ears, for five years, a gentleman had been able to have corn on his table three weeks earlier than formerly.

CORN PLANTED TOO THICK.

Mr. Gale thought it a great mistake to plant corn as thick as it usually is in this State. The more land is worked the better the crop will be. It should be a leading object with farmers to try to make more corn than they now do for use.

John G. Bergen.—It is a great object here to get corn very early for sale, and so gardeners get the seed at the North, and, as this grows short stalks, it is not necessary to plant it wide apart. The distance apart should always be regulated by the size of corn to be grown, and according to the strength of the soil.

SHEEP.

A member read the following condensed statement on the merits of pure bred and cross-bred sheep, taken from an address by Mr. Chas. Howard at a meeting of Central Farmer's Club, held in London:

1. *Southdowns.*—The South, or Sussex Downs, are descended from small gray and dark-faced sheep, which were found on the hilly and mountainous districts throughout England. John Ellman was the original improver. He was followed and surpassed

by Jonas Webb, who has made the Southdown perfect. The peculiarity of this sheep is its superior quality of mutton and wool. Average weight, from thirteen to fifteen months, is 126 pounds; weight of fleece, six pounds. The ewes are capital breeders, and generally produce one-third twins. They are best adapted to elevated situations and bare pasturage. Among the nobility and fancy farmers they are regarded as the elite of sheep.

2. *Hampshire Downs.*—This valuable sheep has been established from various crosses, commencing with the century. They present as great an uniformity in wool, color, and general appearance, as their smaller but handsomer cousins, the Southdowns. They have risen into favor rapidly. They are very hardy, and of good constitutions, and good wool-bearers, the average fleece being six to seven pounds; of early maturity, and have plenty of lean as well as fat meat, and will graze to almost any weight you may choose to make them. The ewes are good breeders and sucklers.

3. *Leicesters.*—These originated with Bakewell. To this breed all other long-wooled sheep are indebted for their improved shape and greater disposition to fatten. The chief characteristics are, great aptitude to fatten with a comparatively small consumption of food, and early maturity; fleece, seven pounds; carcass, at fourteen or fifteen months, 140 pounds. They are not very good breeders, and it is a rare thing to have more rams than ewes.

4. *The Cotswold.*—This is one of the oldest of the established breeds. They were originally heavy, coarse animals, with a thick, heavy fleece, well adapted to the bleak, uninclosed Cotswold hills. They are now *very* hardy, and will succeed well in almost any situation, and produce a great amount of wool and mutton at an early age. They sometimes reach 86 pounds to the quarter. The average weight of an ordinary flock when fit for the butcher, at 14 or 15 months old, is about 180 pounds, and the weight of wool of the whole flock would be about 7½ pounds each. Many of these sheep are now being exported to Australia, to produce mutton for the miners.

5. *Lincolnshires.*—As the western part of Great Britain is famous for its Cotswolds, so is the Northeastern esteemed for the heavy-wooled and large-framed Lincolns, to which district they especially belong, and where, for many years, they held their own.

They, like the Cotswolds, have been improved by an admixture of Leicester blood. The present improved Lincoln sheep partakes largely of the peculiarities of the Cotswold and Leicester, having the expansive frame and nobility of appearance of the one, with the quality of flesh, compactness of form, beauty of countenance, and propensity to fatten of the other; but they far exceed either in weight of fleece. Three year olds sometimes weigh 96½ pounds to the quarter, and yearlings 71 pounds. The weight of wool of an entire flock, under fair average management, is about 8½ pounds each; weight of carcass at 28 months, 160 pounds. The Lincoln breeders consider the mutton excellent, having less fat and a greater proportion of fine-grained, lean flesh, than the Leicesters. The ewes are good breeders, but, like the Cotswolds and Leicesters, they are not good sucklers.

6. *Shropshires.*—These are crosses. Their merit consists in their superiority over any other breed in their own country. They possess hardiness of constitution, excellent quality of mutton, and are prolific breeders; but they are not equal to other breeds.

7. *Oxfordshire Downs.*—This breed of sheep was produced 27 years ago, by crossing the Hampshire, and in some instances Southdown ewes, with Cotswold rams, and then putting the crosses together. They drop their lambs in February, and at 13 or 14 months old they are ready for market, weighing, on an average, 140 pounds each, with a fleece varying from 7 to 10 pounds. The ewes are good mothers, and produce a great proportion of twins.

We might add here, as these last two breeds are crosses, that Mr. Howard stated, as the conclusion of his experience and address, "that from a judicious pairing of cross-breed animals, it is practicable to establish a new breed altogether," and for some locations better fitted than most of the existing breeds.

Subject for next meeting,—"Hedges and walls for fences."

Adjourned.

JOHN BRUCE, *Secretary pro tem.*

February 18, 1861.

Present, 109 members. Mr. Wm. Lawton, of New Rochelle, in the chair.

GRAFTS FOR DISTRIBUTION.

Wm. L. Carpenter furnished apple and pear grafts for free

distribution, two of each kind, of valuable sorts, and this he intends to continue at future meetings.

Mr. Buckhalter, of Pennsylvania, also sent in some grafts of a fine new apple, samples of which were before the Club some weeks since.

HUBBARD SQUASH SEEDS.

Mr. E. Henry presented seeds of the Hubbard squash for distribution, which he hoped would be taken and grown by persons who do not know the great value of this variety. It is an excellent substitute for the sweet potato.

CHARCOAL AS A DEODORIZER.

The Chairman, in an able paper on the subject of fuel, read before "the polytechnic club" on Thursday last, said a quality was attributed to charcoal, which recent experiments, do not confirm, namely retarding decay in animal and vegetable matters; from the short discussion which took place upon the subject I am induced to believe, that its introduction into the farmers' club, may lead to experiment from which the agriculturist may derive much profit. A piece of boiled beef, placed for a short time in charcoal, (finely pulverized,) will be found perfectly deodorized, and as far as taste and smell is concerned, sweet and sound; this experiment has been so often made that it is not extraordinary, that it should be almost universally admitted, that charcoal could not only arrest putrefaction, but restore the animal fiber to all its peculiar and healthful properties as food; thus, opinions may be established, on plausible appearances as well as scientific experiments, that are entirely erroneous. Charcoal, far from being an antiseptic, facilitates the decomposition of any organic substances; but renders them inodorous by storing away in its cells the gases which arise from putrefaction.

Professor Way takes this view of the subject, in a communication before the Royal Agricultural Society of England, to the following effect: "The noxious gases resulting from putrefaction of animal matter generally, consisting principally of sulpheretted hydrogen and sulphuret of ammonia, each particular animal substance, excretion or otherwise, had its peculiar odor, although abundantly perceptible by the senses, and in many cases, as in musk—almost inexhaustible, was inappreciable by weight."

The difference in the action of animal charcoal will not be considered, but the qualities and effects of finely pulverized wood

charcoal in deodorizing and at the same time rapidly decomposing animal substances.

Dr. J. Stenhouse, of England, furnished the following statements to the Journal of the Society of Arts:

"A well known chemical manufacturer placed the bodies of two dogs in a wooden box, on a layer of charcoal powder a few inches in depth, and covered them over with the same material, and left the box open in his laboratory, no effluvia was ever perceptible, and on examination, at the end of six months, scarcely anything of the bodies remained, except the bones;—experiments were subsequently made, with a full grown cat, and with two rats, the bodies became in a highly putrid state, without the slightest perceptible odor in the room,—it thus appears that charcoal is a perfect deodorizer, and favors a rapid decomposition, where it comes in immediate contact with dead bodies. Putrid and unhealthy exhalations, can thus be disarmed of their pestilential influences, without expensive arrangements. Our pig pens, stables, cattle yards and poultry houses, by careful attention, cannot only be purified, but made to yield at the least expense, a manure containing all the ingredients required, by the farmer, for the production of the finest crops as well as to prevent that shameful condition so often talked of, a worn out farm.

Pulverized charcoal can be cheaply obtained, and experiments can be made by every farmer, and every vegetable and animal putrefaction can thus not only be rendered innoxious, but all its fertilizing material preserved for distribution at any time upon our gardens and farms.

Charcoal having the capacity of rapidly absorbing the atmospheric air, and retaining manurial gases and vapors by its peculiar porosity, we must come to the conclusion that it furnishes, from its cells, the proper nourishments to the spongioles of roots in oxygen, nitrogen and carbonic acid gases, while the material itself remains unchanged for many years—when it, it is said, declines into a common earthy substance, of no great value for agricultural purposes.

R. G. Pardee.—Muck is a good substitute for charcoal, and should be much more extensively used by farmers as an absorbent.

Mr. Carpenter thought plaster much better than charcoal as an absorbent, and it has a good effect upon the soil.

Doct. Trimble.—Charcoal never acts as a fertilizer upon land. It is rather a detriment to soil.

Mr. Quinn.—We consider the fine charcoal of locomotives very valuable as an absorbent. It costs us about one cent a bushel, and hauling three miles. It is cheaper than plaster.

R. G. Pardee.—Coal dust costs 15 or 18 cents a bushel in this city. I find it worth that on the garden.

Mr. Quinn.—We don't consider the coal cinders of locomotives worth hauling three miles. It is good on clay soils as a divisor. The charcoal acts also as a divisor, and there it is an absorbent. We mulch all of our pear trees with charcoal dust, and consider it very valuable. We use charcoal dust largely in South Jersey upon almost pure sandy soil, with good success.

HOME MADE GUANO.

Wm. S. Carpenter.—This is the dried flesh of dead animals, taken from the city to Barren Island. After taking out the fat and bones, the flesh is dried and pulverized. I think it a dear manure at $30 a ton.

Dr. Trimble, of New Jersey.—Liebig has come to the conclusion that there is no manure equal to that from the barn-yard. When you want to build up the fertility of a whole county, you cannot do it by any of the substances sold in shops as manure.

It was agreed to take up the question of manures of all kinds for discussion at the next meeting.

TOMATOES—HOW TO PRODUCE THEM EARLY.

Mr. Quinn.—A sash three by six feet may be made so as to produce a variety of early plants. Good soil placed in a box and kept in a room about 60° or 70° till about two inches high, and then transplanted into separate boxes or pots. Afterward transplant them once more. It is necessary to keep the plants in a very even temperature. The soil for boxes, or hot beds, should be prepared in summer, and should be very rich and pulverulent. In covering the seeds, sift the soil over them. The seeds and plants must be well watered and aired. The hot bed requires constant attention by some one who has had experience. Tomato plants should be transplanted two or three times before setting in the field. Cabbage plants will do with one transplanting. Early lettuce plants are kept over winter in cold frames. So are cabbage plants, and I have seen a whole field of cabbages covered with snow after set out.

HEDGES AND WALLS, AND FENCING.

This question was called up.

INCLOSING LAND WITH WALLS AND HEDGES.

Mr. R. L. Pell—Beneficial consequences necessarily result from the inclosure of land. Where it is in a state of arable culture, without inclosure, the crops, of whatever kind they may be, must constantly be exposed to depredations of various kinds; and if in grass or pasture, injuries of the most prejudicial nature must frequently be unavoidably sustained. Inclosing land is a means of obtaining, by art, a certain degree of that genial warmth so essential to the production of valuable crops. Where grounds are sheltered from the violence of wind, by outside walls or plantations of trees, they are more productive, and vegetation is earlier, than in others similar in every respect, except as regard to exposure. It is well known that the warmest air lies nearest the surface of the earth, being that portion of the atmosphere which, like a blanket, nature spreads over the earth and its productions, this outside fences prevent from being blown away. Animals that are kept in a warm, well sheltered barn yard, will be found invariably to advance more rapidly in flesh, and be more free from diseases than those kept in unfenced yards where they have no shelter. There are in many districts, extensive, barren and hilly tracts of land that can never be inclosed with the least advantage; or if they could, that would never derive any amelioration from such a measure. The only means by which they can be improved is, by being rendered, in particular situations, free from injurious surface moisture, by proper drainage, by the introduction of proper breeds of cattle, or by converting them into timber plantations. But, in general, where lands are cultivated under a sytem of management, such as that of alternating grass with grain, and thereby combining improvement in the breed of live stock with that of arable cultivation, the practice of enclosing must always be advantageous.

But, notwithstanding the advantages in numerous points of view, that result from the enclosing of land, the practice is far from having been so much attended to as its importance and utility would seem to demand. This may have proceeded partly from the difficulty that must necessarily attend the business in every case, and particularly in waste land, from the diversity of claims. When the enclosing system is fully appreciated, by its

obvious tendency to increase the produce of land, and the demand for labor, to augment the rate of wages to the husbandman, means will, I hope, be devised by the Legislature, either to facilitate or extend its progress, so that the enclosing of land, even on the smallest scale, would not only accommodate the smallest but the most extensive also.

That such a law passed by our Legislature would promote the advantage of individuals as well as the State, cannot be doubted by those who have considered the nature of the subject. Those numerous commons and waste lands that have so long remained in an unproductive condition, to the disgrace of every county in the State, and a reproach to agriculture, would be immediately put under a system of improvement and cultivation. The benefits that would be derived from the general inclosure of commons would be various. In addition to the increase of value in such lands to the proprietors, which would be considerable, particularly near large towns, to the public it would be of still more extensive utility, as it would be the means of raising and supporting a more numerous breed of cattle and sheep; in consequence of which the markets would be better supplied with cattle, grain, and vegetables. The high value of suburban land, in general, will enable it to bear a larger expenditure, with a view to secure a more productive cultivation. Such grounds are frequently wet, and as a question of economy or pecuniary policy it is important that provision should be made for the removal of all stagnant water and superfluous moisture in the neighborhood of towns. This is of great social importance because it tends to drive the more opulent, who are also, generally, the more educated and refined, to distant places of residence, and consequently, their contributions are lost towards the local taxes and subscriptions. It is certain, also, that whatever renders a place better suited for the residence of the wealthy must enhance the value of the property, and that the expenditure for effecting such a change may prove a profitable investment. The sanitary interests, also, of such localities, urgently demand attention to the drainage and fencing of its suburban lands, for excessive moisture most powerfully influences the local climate both as to dryness and temperature. Dampness always serves as a medium of conveyance for all decomposing matters that may be evolved, and adds much to the injurious effects of such matter on the atmosphere. In other words, excess of moisture in such unenclosed

commons increases atmospheric impurity, and by its evaporation produces fluctuations of temperature that cause chills and aggravate diseases. Therefore, in whatever point of view the business of inclosing common or waste land may be contemplated, it promises advantages of the most important kinds. The humble workman, the wealthy proprietor, and the country at large, must be equally benefited by the salutary influence of such a system wherever it is permitted to take place.

FENCES.

In the enclosing of lands, by means of fences, regard is necessary to be had to a number of circumstances, such as the size of the farms and the nature of them, as well as the uses to which they are to be converted; the particular objects that are in view, or to be expected from them, and the materials of which they are to be formed. It is evident that such inclosures as are chiefly intended for the production of grass ought to be smaller than those in which grain is mostly to be grown. On the lighter sorts of sandy or gravelly soils, too, the divisions should be small in proportion to their dryness, and the particular kind of crops which can be raised and cultivated to the greatest advantage upon them, and the inclosures for sheep should be regulated by the same circumstances. If grain is sown in small inclosures, it will be the first to suffer in a dry summer, particularly near the fences, because the sun is too much excluded, and the dampness generated cannot prevent the redundancy of moisture from chilling the plants, and leaving a harvest that will be of no value to the farmer. If your fences are hedges, they should be kept closely clipt, and every possible method taken to promote the free admission of the sun's rays, with a perfect drainage and evaporation.

But though the stagnation of the air in confined situations may have an injurious effect on vegetable as well as animal life, by preventing the proper degree of evaporation from taking place, it is not less injurious to the feeding of animals than the growth of vegetables, when it circulates too much or too rapidly over a district, especially where the elevation is high, for in such cases the warmth of the animals is too suddenly carried off by the too frequently renewed application of cold air, and the growth of the vegetable thereby checked and retarded. In such situations hedge fences should be used, and particular attention

should be paid in planting them, so as best to break off the wind they would be most exposed to. There is no doubt but that if inclosed land be intended for the purposes of grass, grain or root crops, it will be the most advantageous to avoid the extremes of very large or very small inclosures, but in the latter case they may be left more large and open than in the former. From fifteen to twenty acres, according to the extensiveness of the farm for grazing land, and from thirty to sixty for arable land.

It may be concluded, that the more equable, in respect to temperature, such fields as are intended for pastures can be made by means of judicious fencing, provided they be properly drained, and a due circulation of air preserved, the better they will fatten the animals that are kept in them. Fences are of different kinds, and built of different materials, according to the situations, and the particular circumstances under which they are constructed, but, in general, so far as the farm is concerned, they may be considered either as hedges, ditches, palings or walls. It is obvious, from the nature of these different fences, that one variety of them from its being formed of some dead material, must, in every instance, from the time it is completed, be constantly getting worse, or proceeding to a state of decay, while another, being composed of living plants, where properly managed and attended to, must be advancing to a state of greater improvement and advantage. This difference shows the advantage of having recourse to one sort of material in preference to the other, where there is a possibility of doing it; but in some districts, and many exposed situations, it is often a matter of great difficulty and expense to procure such sorts of materials as would be the most beneficial for the purpose; in such cases that sort must be employed which is the most ready and convenient. The dead kind of fences, whether they be formed of earth, stones, or wood, can rarely, from the expense, be made by the farmer of such height, or in such ways, as to be of much utility in affording shelter. Where this sort of material is employed as a fence on elevated and exposed places, it should be constructed in a firmer manner, and be built higher than when used in lower and more sheltered situations.

WALLS.

Where stones are abundant, the outside as well as inside fences, are made of this material. In the construction of walls, different methods are pursued in different states; they are made simply of stones, with stones, lime or mortar, and sometimes by interposing clay or turf between the stones.

The first are denominated dry stone walls; the second, stone and mortar walls; and the third, earth and stone walls. There is no doubt but that where earthy material is employed in building these kinds of fences, they cannot be so durable as where stones alone, or stones with lime, are used, as from the continual action of the air, and the destructive power of frost, such substances quickly moulder away, and the fences soon present a state of ruin.

Stones when built into walls in the dry way, if the work is well done, constitute a good and durable fence; but a better and more lasting, though much more expensive method, is that of using lime, which binds and cements the walls together, and prevents them from falling down.

In preparing the ground for the foundation of walls, it should always be dug up to such a depth as that the frost may have no effect on it; they should always be coped at the top with flat stones. In building dry stone walls, two men ought constantly to be employed opposite to each other, in order that the surface of their work should be level and smooth. Long stones should be selected for the purpose of being placed occasionally across the wall in order to bind it thoroughly together. These are called through stones, and are ordinarily placed about the middle of the work. The stones employed in the constructing of every kind of wall should me made as flat as possible either by quarrying, or some other means, before they are made use of, as by such a practice, walls are built with great facility and expedition and become very strong and durable, and so far as the purpose of a fence is intended they are the best of all, as they occasion the least waste of ground, do no injury to the grain crops, and are more free from weeds and rubbish than the generality of fences. For a limited number of years, where stones can be procured, there can be but little doubt but that wall fences may be preferable to most other kinds, as they can be easily repaired in cases of accident, and keep all descriptions of stock very secure.

PLATE. 1.

Fig. 1.

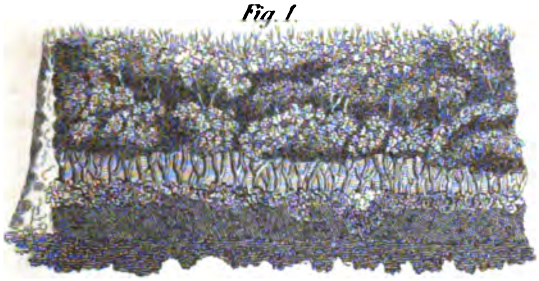


Fig. 2.

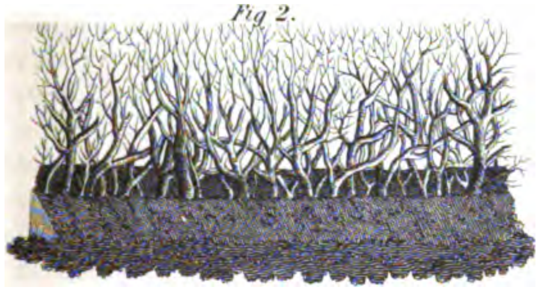


Fig. 3.

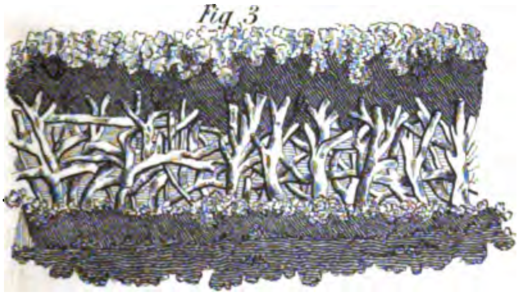


Fig. 4.

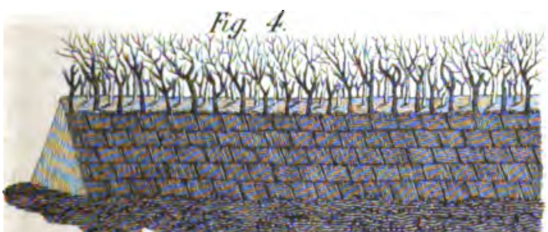


Figure 1 is a very good representation of a White thorn hedge, it is wide at the bottom, and much narrower at the top; it is planted in the ridge form.

Figure 2 represents a hedge planted in the face of a bank.

Figure 3 is the representation of a hedge at the bottom of a bank.

Figure 4 represents a neat hedge on a bank.

Lith. of C. Van Benthuysen, Albany N.Y.

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PLATE. 2.

Fig. 1.

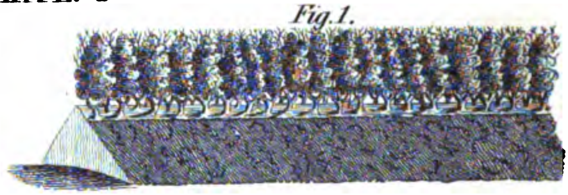

Fig. 2.

Fig. 3.

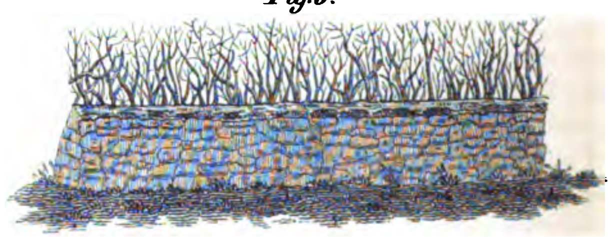

Fig. 4.

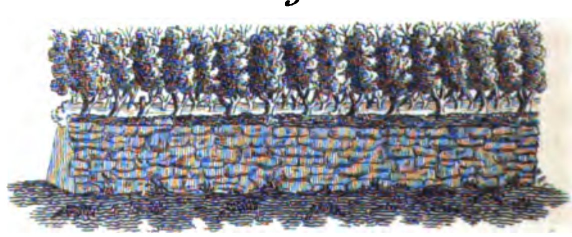

Figure 1 is a fair representation of a hedge on the top of a bank.

Figure 2 shows the proper mode of planting a hedge on a bank, and protecting it with a willow hedge, while the plants are young.

Figure 3: a hedge with a wall.

Figure 4 represents a hedge on a wall.

Lith of C. Van Benthuysen. Albany N.Y

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HEDGES.

In raising quick hedges, the planter should pay particular attention to the nature of the soil and situation of the ground, and adapt his plants accordingly; which may generally be done by observing the growth of such plants as are already on the land, and he may employ either one for this purpose. On dry soils in good heart, especially for outside fences, the honey locust ought to be preferred. It is a certain grower, very lasting, and not liable to be cropped by cattle on account of its thorns.

In low situations, where surface water abounds, and the soil is retentive of moisture, the farmer must necessarily have recourse to the willow tribe for forming his hedges, as under such circumstances they grow not only with great vigor and rapidity, but are capable of being converted to a variety of useful purposes. They do not, however, make a very good fence, and often prove injurious to cattle, by their cropping and eating the young shoots too freely. Young cattle have been killed by them.

Where cattle are to be pastured, it is better to have recourse to honey locust, as they may be raised upon such soils by raising the ground to plant upon. But on such banks as are liable to be carried away by the overflowing of streams, the alder and willow may be planted together advantageously, as by throwing out a great number of spongioles from their roots they afford much support to such banks. And in very exposed and elevated situations the birch and beech will be found good plants for raising live hedges with, as experience has shown that by proper attention in such places they form good fences in a very short time.

Wherever a mixture of different varieties of plants is employed in making a hedge, such should invariably be selected as are capable of thriving well on the same variety of soil, and in the same situation, as well as of growing with equal degrees of strength; for without this a very imperfect fence must be formed, for the reason that while some of the plants are thriving with great vigor and luxuriance, others will proceed in a feeble and sickly manner from being checked by the shade of the larger ones, thus rendering the hedge uneven, defective and thin.

Before any variety of quick hedge is planted, the line of ground on which it is to be placed should be plowed up, and put under such a degree of preparation as will render the soil of whatever kind it may be perfectly friable and mellow, as by such means the spongioles of the plants will be enabled to shoot out

and establish themselves in the ground, and be less liable to injury from weeds. When taken from the nursery great care should be exercised not to injure the roots, and if any are wounded they must be cut off with a sharp knife, in a slanting direction, and they will make rapid growth, frequently forming a hedge two years sooner than when treated in the common way. Plants should always be removed to a richer soil than they were raised in, and they will grow vigorously. A strong plant which has grown up quickly, and arrived at a considerable growth in a short time, never fails to succeed better after transplanting than another of the same age that has been stinted, whether the soil in which they are planted be poor or rich. I would therefore invariably select for a nursery the richest spot on the farm, and make the ground richer still when I set them out; and, in selecting, would also prefer the youngest and most healthy, to those much older, even if of a greater size.

If honey locust is intended for the hedge, such plants succeed the best that possess the greatest number of fibrous roots, and it is therefore a matter of importance to adopt such methods as tend to produce such effects while they are in the nursery. This may be effected by transplanting at an early period, as the first or second year, according to the growth, and lopping off all such roots as have a tendency to strike directly downwards, or extend in a lateral direction. In the fall succeeding the time the locust has been transplanted from the seed beds, the earth between the rows should be dug over with a spade, taking care to go within three inches of the plants and to work with a very sharp instrument, the operator always taking care to force his spade straight down, with the back towards the plants, on each side of the row, so as to cut the largest portion of the lateral roots, which will tend to make new fibres branch out into still more numerous ramifications; and every time the ground is dug dig in the same manner, though at a greater distance from the plant; this will keep the fibrous roots so near the stem that when the plant is lifted to be placed permanently in the hedge, it will not fail to be provided with such an abundance of mouths to imbibe nourishment, as not to be in the least danger of suffering greatly by the operation.

In collecting plants for forming honey locust hedges, it has been the custom to prefer such as are small and young; but it is far better, as well as more expeditious to have them older and

larger, as where the plants are of good size the hedge is more readily formed, and the plants less liable to be injured by the severity of the first winter or heat of the first summer, and require far less nursing. In using plants of large size, great care should be taken to have all the roots preserved. But whatever the size of plants employed may be, it is necessary to have all such as are to be planted in the same fence as nearly of the same size and vigor of growth as possible. By proper attention in this respect the fence will be free from gaps and thin places, which would otherwise be the case from the inequality of the growth of different sized plants.

When the quicks are planted, whatever the age or size may be, do not cut any roots except those that may have been broken or bruised, as it is always of importance that as many fibres as possible be left. A portion of the tops may be cut away, because no matter how much care is exercised in taking up, the roots will always sustain some injury, and will not be able to supply nourishment in sufficient quantity to prevent a portion of the top from perishing. Older plants require more cutting than young ones.

There are various modes of planting live hedges. In some cases the plants are placed in a horizontal direction upon sods turned grass side downwards, on the sides of ditches or walls, and covered up so as to have but a few inches of the plants without, in order that not more than two shoots may be thrown out by each. When planted in this manner a good bed of mould should be made for the reception of the roots, and they will thrive admirably. If they should happen to throw out more than two shoots the supernumeraries should be trimmed off close to the stem the first fall after planting, for it is the lårgeness of these original stamina of the hedge that will afterwards constitute its strength, and not the number of small branches as is generally supposed. If the shoots are numerous, they never acquire such a degree of strength as when there are fewer of them.

Quicks should be straight in their growth, with clean strong stems, that have been twice transplanted from the seed bed, they then have a great number of fibrous roots, which, as has been shown, renders them more certain of succeeding on being planted out. They should be well hoed and weeded as often as necessary, and every sort of rubbish be carefully removed from about

their roots and stems. In young hedges this work should be done as early as possible in the spring, in order that the weeds may not get too great a head; and the best way is to pare the surface off thinly with a spade, which not only renders the plants clean, but likewise exposes the ground contiguous to them to the mouldering effects of the air.

The common custom of cutting and clipping young locust and other quick hedges every year, however advantageous it may be considered in point of the appearance of the fence, is very prejudicial to the growth of the quicks, keeping them small and weak in the stems, and rendering the hedges, as they advance in years, open at the bottoms. Whereas those left more to themselves become strong in the stems, and have large side branches, which by interweaving with one another render the hedge thick and impenetrable.

Those that are cut at proper intervals, as about every five or six years, are superior to those which have been clipt from the time they were first planted. Besides there is a great saving of labor, and the hedges are far more profitable. When pruning is necessary it may be performed in a neat and expeditious manner by means of an instrument made in the form of a reaping hook, and exceedingly sharp, to which is fixed a handle about two feet long, this in the hands of an expert gardener is an admirable instrument.

The time at which hedges are generally cut is in summer, which, from the state of vegetation, is the most improper that can be selected, because the plants are then full of sap, and can not but be much injured. The latter part of the fall is probably the most suitable, when the plants are in a much less vigorous state.

In respect to the manner of cutting them numerous methods are adopted and practiced, but that which appears to give the most useful form is by sloping them on both sides from the bottom to the top, as by such a mode the thickest part will be in the bottom where it is most required. Another erroneous practice is to top a hedge while young, which tends greatly to diminish its strength, because it induces it to send out a large number of small stems, which being cut again are divided into still smaller and more numerous ramifications, till their number is increased to such a degree, and their size, of consequence, so much diminished, that the hedge may be said to consist entirely of twigs,

PLATE 3.

Fig. 1.

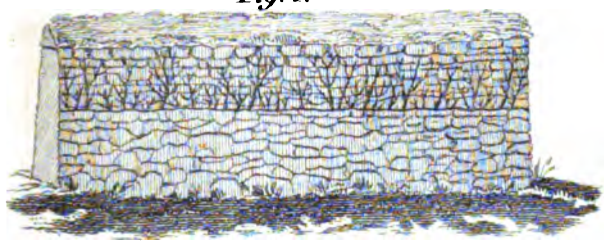

Fig. 2.

Fig. 3.

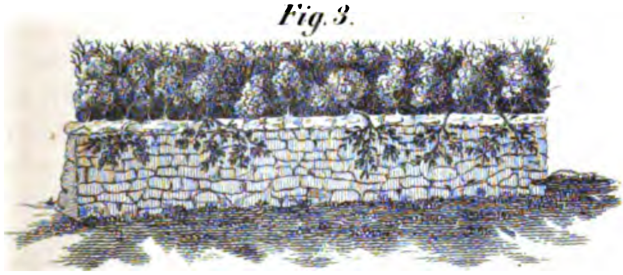

Fig. 4.

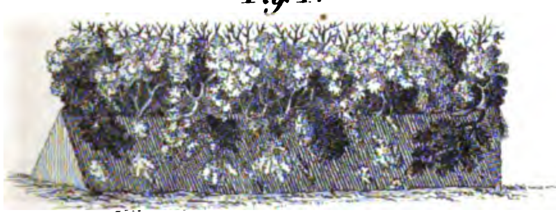

Figure 1 is the representation of a hedge in the centre of a wall.

Figure 2 represents a hedge and ditch with trees on the top.

Figure 3 is a hedge on a bank faced with stones.

Figure 4 represents a hedge flush on the top of a bank.

Lith. of C. Van Benthuysen, Albany, N.Y.

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PLATE 4.

Fig. 1.

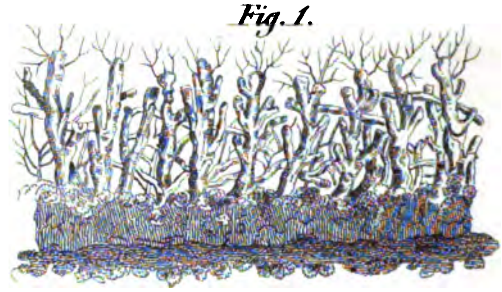

Fig. 2.

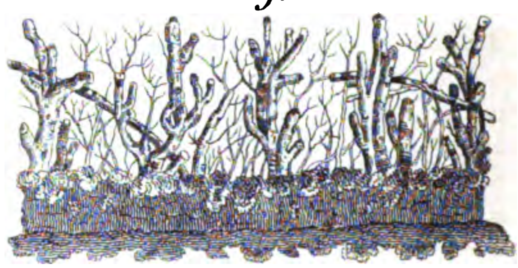

Fig. 3.

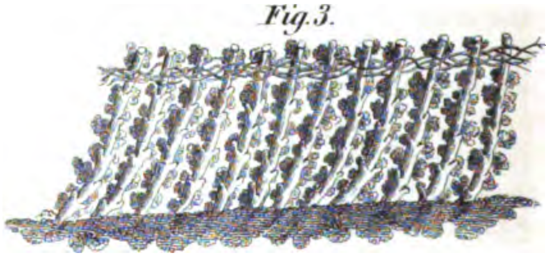

Fig. 4.

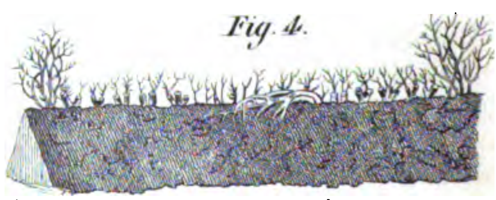

Figure 1 is an old hedge that has been cut over, and the first year's growth upon it.

Figure 2 is a hedge partially cut over, with some of the old stems uncut to fill vacancies.

Figure 3 is the representation of a quick hedge, with the stems nicked and turned down, and then bound at the top with willows.

Figure 4 is a mode of mending a gap where the hedge has been cut down, the old stems remaining are bent and fastened by means of hooks, and then covered with mould, in order that it may send up shoots and fill the vacancy.

Lith. of C. Van Benthuysen Albany N.Y.

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which have not sufficient strength to resist a moderately sized bullock, when one properly grown for strength and closeness would bid defiance to an elephant.

When a hedge is topped the sap that would have gone to increase its head being suddenly stopped in its ascent, forces out innumerable shoots all around the stem, immediately below the place where it was cut, these draw the sap so powerfully through their capillary tubes that they occasion such a deep shade below them that all the horizontal shoots which had sprung out from the stem, near the roots, being deprived of their nourishment, and the genial influences of the atmosphere, are checked in their growth, and in a very short time totally perish, leaving the stem at the root quite bare. And as there are, from that period, no branches springing immediately from the under part of the stem to detain the sap in its passage, and make that part of it increase in size, it there continues small and weakly, while the top, continuing to advance with luxuriance, becomes so large and weighty as to be with difficulty supported by these small trunks, which gradually become barer every year, until the bottom is quite open, when the hedge is of no further value. But if a hedge is allowed to advance in height, without being cut in at the top, the small branches that spring out near the root, not being starved by the extraordinary suction, or suffocated by the shade of too luxuriant branches above them, continue to live, and detain a portion of the sap so as to make the under part of the stem increase in size and strength, and be well able to support the small top that it thus acquires. And if the most luxuriant side branches that may spring out above, are, from time to time, pruned away, so as not to be permitted to overshade those below, these last will continue to grow as long as the hedge lasts. Let your aim be to make the principal stems advance with great vigor, gradually tapering from the root upwards, because upon this the whole future strength of the hedge depends; and if these are once rightly formed, it will be an easy matter to give the fence every quality that could be wished. For if these strong stems should be entirely destitute of small branches, an abundance of them may be made to push out by only making a slight wound in the naked stem, wherever you desire that young branches should appear, for below every such wound a number of small shoots will spring forth the following season; the points of which being cut off a still greater number of small twigs will be sent out,

which by being frequently cut, will, in a short time, grow a covering as close as could be desired, so much so indeed that it would be impossible for a small bird to penetrate it.

If it is desirable to plant a hawthorn hedge it is well to know that it is impatient of much wet resting near the roots, and ought never to be planted at the sides of ditches that have much stagnant water in them. The common method of planting quicks on the borders of ditches is in most cases, a bad practice; for whatever the nature of the soil may be, from the effects of the weather, and numerous other causes, the mould on their sides is constantly crumbling off, and leaving the roots of the plants exposed and without support. I planted many thousand quicks two years since on a plain surface without raising any bank, by digging out a spit of earth with the spade, in which I placed the plants against the side of the trench, at the distance of about nine inches apart, and covered them with the mould taken from a short distance off, and finished by treading it closely to their roots. I then placed the earth that came out of the trench close to the plants, and left it loose that the same might penetrate more easily. I did not apply any dung for the reason that it is apt to breed insects, which are particularly injurious to the roots of young quicks. Quick set hedges are very beautiful to the eye, and if the climate, depth and quality of the soil be such as to throw out a vigorous shoot, and good attention be paid to them in their infancy, they will prove themselves less expensive than any other fence; and at the end of fifteen years, will yield a sufficient produce if cut down and plashed to pay all the expenses incurred in the first making; and this cutting may be continued every fifteen years without injuring the stocks.

In the management of old hedges, many different methods are employed. Where they become stunted, from the badness of the soil in which they happen to be planted, or other causes, the best mode of recovering them is to cut the plants of which they are composed down close to the ground in the early part of spring, keep them entirely free from weeds, manure them with lime and ashes, and treat them as above directed. When the young buds begin to shoot out, rub them all off with the hand, except two of the strongest, which are best located for shoots: as where the whole number are permitted to grow, they become weak and restricted in their growth as in the former case. For the want of attention to this, I have seen hedges completely spoiled.

PLATE 5.

Fig. 1.

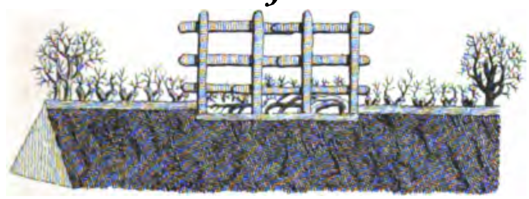

Fig. 2.

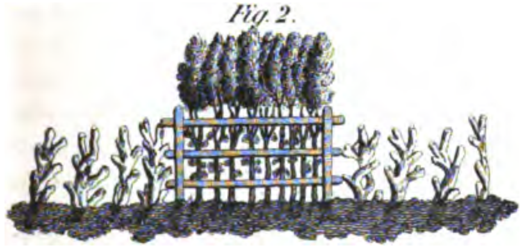

Fig. 3.

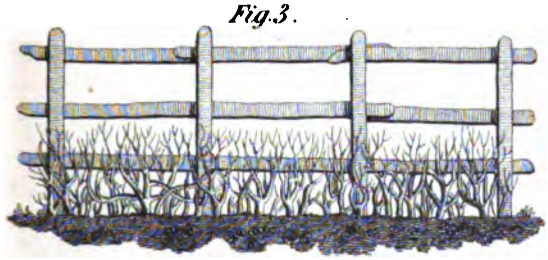

Fig. 4.

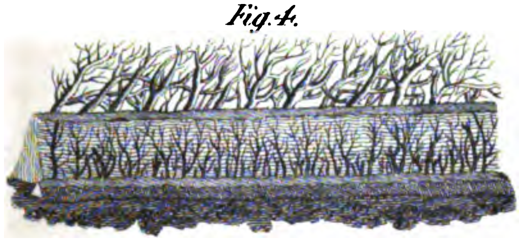

Figure 1 is the representation of a repaired hedge, protected in the opening by a pale fence.

Figure 2 represents an old thorn hedge cut down, and an opening repaired by planting young trees.

Figure 3 exhibits a hedge protected by a pale fence.

Figure 4 is a newly planted hedge, with a dead hedge on the bank to protect the young plants from injury.

Lith. of Van Benthuysen Albany N.Y.

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PLATE 6.

Fig. 1.

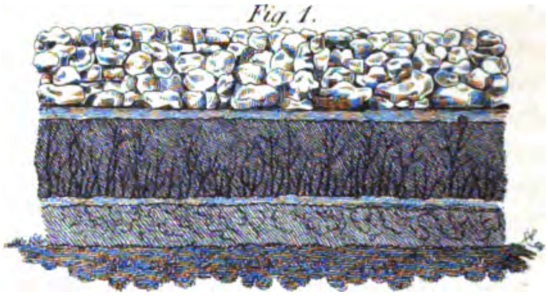

Fig. 2.

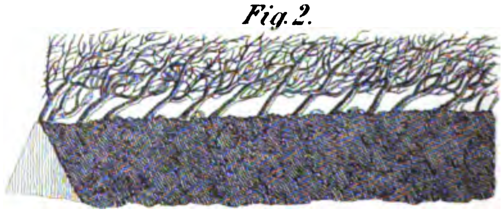

Fig. 3.

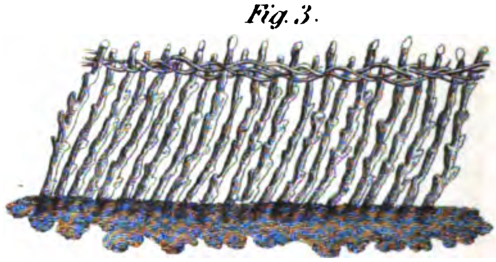

Fig. 4.

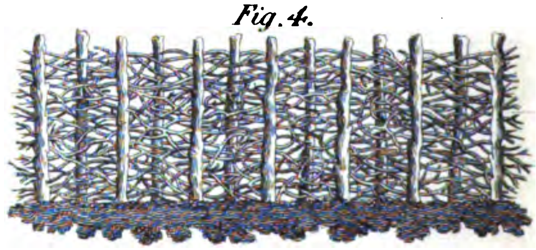

Figure 1 a hedge with ditch protected by a stone wall.

Figure 2 represents an ordinary hedge that has died.

Figure 3 a dead hedge bound together at the top.

Figure 4 is the representation of a dead hedge known by the name of stake and band. It is made of dead materials run between strong stakes.

Lith of C Van Benthuysen Albany, N.Y.

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Where land is exposed to sea air it is exceedingly difficult to raise quick fences upon it, in all probability on account of the enormous quantity of muriatic acid conveyed in the air, which is very destructive to the white thorn, and many other plants used in the making of hedges. As beech is proof against sea air, perhaps it might, in such situations, be used advantageously. The growth of these plants is rapid, they therefore form, not a beautiful fence only, but one that affords advantageous shelter, from the fact that the leaves are not easily affected by fall winds, and often hold on until winter is advanced. If they are planted in three rows, fourteen inches apart, at maturity two rows may be taken for other uses, and the other plashed and trimmed to make a good substantial fence; willows, likewise, and other aquatic plants, might be used in such exposed places.

When barren soils require to be fenced, the red cedar will flourish on them, and forms one of the most beautiful hedges imaginable; it may be cut into any fanciful form, not being easily injured by the shears, and will live to a great age.

THE OSAGE ORANGE,

Which grows wild in Mississippi and other southern States, makes an admirable hedge, when clipped two or three times a year; it has numerous branches, each one of which is covered with small sharp thorns; the male and female are separate trees, and both exceedingly strong and tough. When the seeds are collected, expose them to a winter's frost, and sow them in seed beds well prepared and disintegrated early in the spring. A quart measure contains eight thousand five hundred seeds, which may be purchased at any of the seedsmen for $4.50.

THE BUCKTHORN

Is probably one of the very best plants for hedges in the United States, it will do well any where in the country, grows quick, is remarkably hardy, never diseased or injured by insects, may be trimmed without injury, and will last for an indefinite period of time. The coldest winter has no apparent effect upon it; it leaves out early in the spring, and retains its verdure until late in the fall. The quicks should be taken up with great care, and as the roots run deep, a sub-soil plow may be passed up and down twice on each side of them, when the rest of the work can be easily accomplished with the spade. They should be assorted before planted, they will then grow uniformly together, and pre-

sent a pretty appearance from the start. When set out cut off the tap roots, and all ragged spongioles, and never place manure in close contact with the fibres. Protect the hedge for six years from cattle and sheep, and be particular to keep the ground thoroughly cultivated and enriched; one year's neglect will cause as many seeds of weeds to grow with the hedge as will fully occupy the spare time of the planter ten years to eradicate.

Mr. Carpenter advocated small inclosures, particularly for pastures, and frequent change of stock from one to the other.

Mr. Pell.—Although I have made an address upon fences, I am not an advocate of them. I am opposed to all fences, and to cattle running at large, except on the great prairies. Our fences cost more than the national debt of Great Britain, and it is all waste capital. In Germany the cattle are never allowed to run at large upon the fields devoted to cultivation. Cows running at large lose almost as much as they gain running over the fields.

Dr. Trimble.—I look upon all fences as evils. I hear of ornamental fences, but I never saw one that I considered an ornament to the farm. Much time and money has been spent in Pennsylvania upon attempts to make thorn hedges, and have been nearly all abandoned. The best fence is no fence.

Adjourned.

JOHN BRUCE, *Secretary pro tem.*

February 25, 1861.

Present, 100 members. Mr. R. L. Pell in the chair.

BURNING OF ASHES.

Mr. Robinson, in behalf of a correspondent, suggested the question,—What is lost by suffering ashes to remain in stoves to burn over and over for ten or twelve days?

Dr. Waterbury said that it seemed possible to burn ashes too much, because the action of the fire might render insoluble a certain portion of the saline matters which were before soluble. Glass is composed of the same materials as ashes, the salts being rendered insoluble by heat.

Mr. Carpenter inquired whether, in reducing two bushels of ashes to one by burning, the one bushel would not be as valuable as one bushel before burning, or even more valuable.

Dr. Waterbury said that he had been asked by a scientific gentleman what became of the potash in burning charcoal. He

did not know, but thought it probable, as no ashes are left, that the potash is sublimated, passing off in a vaporous condition. Air-tight stoves make less ashes than common stoves, but whether the ashes are stronger or not, he was not prepared to say.

Dr. Weaver.—People generally do not burn wood for the sake of the ashes, but for the heat; and we know that ashes in a stove form a reservoir for heat. The effect in evaporating the salts is of very little consequence.

Dr. Waterbury.—The ashes of anthracite coal have scarcely any potash in them. By the process which fossilized the wood, the potash has been dissipated, just as it is in the coal pit, and in air-tight stoves. The silica and potash, which by a sufficient heat will form glass, must enter the plant in a soluble state. So that ashes may be injured not merely for leaching, but for agricultural purposes by over-heating.

Mr. Robinson had 100 barrels of ashes almost ruined for leaching by taking fire after having been stored away in a brick ash-house. The ashes taken up from an ordinary fire contain probably ten to twenty per cent. in bulk of charcoal. When that charcoal is ignited, the fire will run through the heap. It is not safe therefore to put hot ashes into a barrel, even if they are not allowed to touch the wood.

FRUIT ORCHARDS.

Mr. Henry inquired whether red clover is injurious in fruit orchards. He had been informed that it is, and that its effects could be perceived in the dwarfed appearance of the trees.

Mr. Carpenter said that the tree should be encouraged to feed upon the surface, while the red clover feeds far beneath. The red clover dies out every few years, leaving the ground in a better condition. He should have no objection to it for an orchard.

The President.—Any crop grown in an orchard is disadvantageous to it. The roots of the apple tree extend from fourteen to twenty-eight feet deep. I have found them as large as my arm fourteen feet below the surface. Horses should never be used in plowing among trees. We should always plow with oxen, and as near the tree as possible. We cannot injure an orchard by plowing if we commence in that way; for the principal roots will grow out of the way of the plow; but if we take an orchard where the roots have been habituated to grow near the surface, a deep plowing might injure it.

Dr. Waterbury remarked, that from the appearance of the trees in the public grounds, he should judge that the operators had what they took off for fire-wood. He supposed that there was usually no necessity for taking off large limbs. He inquired how large limbs ought to be removed.

The President would never take off a limb larger than his wrist. He would only curtail an orchard where the limbs cross each other. A tree should be trimmed in June; for then the power of recuperation is so great that the wound will heal over in two years. If trimmed in the winter, it will take from three to five years, by which time incipient decay has commenced, and the tree will be found rotten at the core.

Dr. Waterbury said that he should have supposed that a limb as large as the thumb was large enough to take off.

Mr. Carpenter.—By going over the orchard once a year there will be no necessity for taking off limbs larger than the thumb. He would cultivate an orchard with the spade, covering the ground, except round the trees, with grass, and spading as far out as the limbs extend. His plan had been to spade the ground in the spring, and to mulch with coarse barn-yard manure. In August he would go over it again and dig that in. One man could go over from 50 to 100 trees in a day.

Dr. Weaver inquired what would be the effect, if we should cut off the whole top of a tree to insert grafts.

The President.—It will kill the tree immediately. Nine trees out of ten would be killed by it.

Mr. Pardee.—Not so many as that.

Mr. Lawton had had 94 wild trees grafted in this way some 20 years ago; and none of them came to anything. A pear tree will bear a greater amount of pruning than any other.

The President said that the better way would be to graft one-half the first year, and leave the other half to carry the sap from the roots. In grafting, three or four limbs should always be left for this purpose.

Mr. Robinson had 40 or 50 old apple trees, which were trimmed very heavily, and 1,122 grafts put in last spring, and 1,110 of them lived all summer. But all of the limbs were not cut off.

Mr. Carpenter said that in about one-half the instances where, in grafting, no limbs was left to carry off the sap, the tree would die. He would recommend grafting one-third of the tree each year, commencing at the top. In grafting he would not allow

the terminal bud to grow, but would take any other two buds of new wood. He had found no difference between the two ends of the shoot; both would grow equally well.

Mr. Pardee said that when the old orchards were renewed some twenty years ago, sometimes a farmer, too impatient to allow two or three years, would sweep away the whole at once; and it was astonishing to see how many of those trees would live.

Dr. Trimble.—If you graft a tree all over, you will still leave twigs enough to nourish the tree.

The President.—My idea is that when you cut off a limb of a tree, a corresponding root invariably dies; and if you cut off a root, a corresponding limb will die. When you cut off a limb, the sap is not carried away from the corresponding root, and it dies. New spongioles will then be found, as new branches start upon the tree.

The Secretary, Judge Meigs, sent in the following communication:

CALIFORNIA.

The California Farmer of January 12, 1861, says, the country is already a garden and farm, and the land is (some of it,) worth $100 and even $200 an acre!

That during last year salmon have been caught in California and Oregon to the amount of 11,400 barrels.

That it is considered best to import seeds even from Europe instead of using those grown in California. For some reasons not well understood seeds raised here are of inferior value.

That fruit and ornamental trees are best grown here instead of imported.

NEW PLOW.

Messrs. Settle & Cottle, of San José have made many. Three of them form one gang, requiring no one to hold but are all together, drawn by four horses driven by one man, and scattering the seed and harrowing it in *four acres per day and better done than any other way.* Cost of the machine $200.

He recommends importation of seeds and says Charlwood, of London, showed him, in his seed warehouse, London, among other seeds, clear mignonette seed, for sale by tons weight, &c.

I do not find whether California has succeeded in raising good cotton. I wish the Club would look at this.

Let us know whether the long summer drought, as in India, Africa, and elsewhere, *except in this country*, is the reason why cotton will not succeed in California. Our repeated summer thunder showers are believed to be indispensible to good crops of cotton. Egypt grew cotton as she did grain and every thing else, by irrigation from the Nile.

The regular subject for consideration being taken up:

MARL.

Dr. Trimble.—There is a belt of land in the State of New Jersey running from Sandy Hook in the east, southwest to Salem county, on the Delaware river, about 90 miles in length by 14 wide in the east to six miles in the west, that has lying under it, at a greater or less distance below the surface, this marl—this great fertilizing and renovating material, that has already worked such wonders in some localities, and which is destined to bring about mighty results in the future.

This belt comprehends 900 square miles, or 576,000 acres. And as this material, by means of increased transportation, can be made to overflow these borders, as the coals overflow from the mines of Pennsylvania, no one can calculate what the future has in store from this source.

To New Jersey it has already been worth millions of dollars in the increased value of land and crops, wanting only labor, not capital, to reward and encourage enterprise.

The marl is found in three different layers. The first one found principally in the uplands, and on farms where the surface is uneven it may be found on almost every field.

The other layers are seldom revealed except along the water courses, but may be opened any where by digging.

Its value was probably first made known by scattering the earth taken out when digging wells.

The beds of this marl run in particular directions according to fixed laws, and they have rules by which they can be found.

At the time when the geological surveys of the State were made there was quite a difference of opinion as to what ingredient was the cause of its agricultural value.

Of those who have analyzed it: Seybert says it was potash, of which he found ten per cent., that gave it its value. Some said it was owing to its shells or calcareous ingredients, but very little of these are found in the sand marls. Vanuxem said the iron

pyrites was the cause of value. Prof. Rogers ascribed it to potash. Professor Johnston says the one or one and a half per cent. of phosphate of lime does it.

From five to twenty loads per acre often produce quick and decided effects. From 100 to 200 loads to the acre will last fifteen or twenty years.

Some parts of layers are poison and are called burning marls, and will destroy vegetation for years. Some of the clays above and below the marl will do this also. This is owing to sulphate of iron or copperas, and, occasionally, some alum mixed.

It is easy to detect these by well known tests and they can readily be avoided. You may even taste them.

The water taken from wells sunk in these places will turn tea black if infused in it. The green sand marl when crushed on paper will leave a green stain. It is said the best marls have the most phosphoric acid. The counties of Monmouth, Ocean, Burlington, Camden, Gloucester and Salem, lie in the course of this sand marl. The shell marls are in Salem and Cumberland counties, on the Delaware. Marl is also found in Sussex county, the northwest of the State and bordering on New York.

The shell marls are found under about 20 feet of sand, but is usually taken from the banks of the water courses. It is from 10 to 14 feet thick, and is filled with shells, mostly in a crumbling state, and slakes to a fine powder when exposed to the air.

ANALYSIS.

	Squankum.	Burlington.
Water	10.600	10.470
Silica	51.162	55.930
Protoxide iron	16.200	22.855
Alum	6.100	
Potash and soda	4.274	5.800
Lime	3.478	1.640
Magnesia	2.037	1.013
Phosphoric acid	4.540	1.680
Sulphur	0.429	0.957
	100.	100.

A bushel when dry weighs about 80 pounds, 4 pounds of which is potash, or nearly as much as there is in a bushel of unleached wood ashes. The two per cent of phosphoric acid (and often

more,) can be compared to the superphosphate of lime, but the other constituents are also valuable; but the great value of marl is to be found in the fact that it contains nearly all the substances necessary to make up the ash of our common cultivated plants.

Marl has been found peculiarly adapted to the growth of potatoes. See what you get from Monmouth county! White clover is also a test for the value of marl, but not when acid is present. After a few years use some soils will require the use of lime, and then its benefits will again go on as useful as ever, like lime and manure in parts of Parma, there seems no limit to the increased productiveness of land by this grand fertilizer. The smaller the marl grains, the more promptly it acts.

Squankum marl, probably the best, is worth seven cents per bushel at Freehold, and railroad communications diverge from there in all directions. Water for navigable purposes approaches these beds in many places.

Mr. Lawton said that at 7 cents per bushel the marl was worth $1.50 per load besides transportation. Putting on 200 loads to the acre, it would amount to $300; the interest of which would in itself go far towards keeping land manured. He believed, therefore, that it would be impracticable to apply it in large quantities where the cost of transportation would be considerable. He was in favor of the use of deodorised manure for fertilizing purposes.

Mr. Carpenter said that there were various concentrated manures which would answer the purposes of farmers in this vicinity better than marl. Land can be manured here for five dollars an acre, which is less than the interest of the cost of the marl would be. He referred to bone-dust and guano as excellent manures.

Dr. Waterbury.—Four pounds of potash at 5½ cents per pound will amount to 22 cents for the potash alone in a bushel of marl, which is sold for 7 cents. If this potash were soluble, the people of New Jersey would leach it out rather than sell the marl at that price.

Dr. Trimble referred to the farming lands in New Jersey, which, according to the census of 1850, were worth $7 per acre more than those of any other State of the Union, as an evidence of the value of marl, which had been the cause of the high value of those lands.

Mr. Henry spoke of the increased value of farming lands from the use of lime. Commencing with 25 bushels per acre, the amount can be increased as the amount of vegetable matter in the soil for it to act upon is increased. Lands worth but $10 per acre have been raised to $35 by the use of lime only.

Prof. Nash said that in the southern part of New Jersey lands worth $10 per acre had been raised to $110 by the judicious use of marl; and wherever the marl could be had for 14 cents per bushel, he believed it to be the cheapest manure that could be applied. The universal testimony that marl largely increases the potato crop, shows that a portion of the potash is soluble and takes effect immediately. Other portions are insoluble, and remain for an indefinite time in the soil.

Mr. Quinn said that the value of marl was local in its character. While its application benefits the sandy soils of Monmouth county, (N. J.,) it will not have the same effect upon the red clay soil of the northern part of the State.

On motion of Mr. Carpenter, the same subject was continued.

At the suggestion of the Chairman, it was agreed that the subject of "The grasses of New York," should be taken up after the other shall have been disposed of.

On motion, the club adjourned.

JOHN BRUCE, *Secretary pro tem.*

March 4, 1861.

Judge R. S. Livingston, of Dutchess county, in the chair.

MISCELLANEOUS.

Mr. Lawton, of New Rochelle, presented specimens of a broad-leaved garden cress, having all the flavor of the common water cress, and growing on dry land. It is the first green thing that appears without protection, and he considered it a very valuable article.

Dr. Trimble, of Newark, N. J., reported that the peach buds in his neighborbood were all safe, and that there was a prospect of a plentiful supply of peaches. His experience had been, that if at any time in the winter the thermometer fell as low as 18 degrees below zero, the peach bud would be killed.

Mr. Carpenter presented specimens of vegetation—the spirea rose and lilac—started by the warm weather of the last few days;

also a specimen of the pampas grass of South America; also grafts from pears and apples of the best varieties.

Mr. Lawton said that it was not light frosts that occur early in the spring that injured fruit, but the exposure of the embryo fruit itself to the frost. An apricot tree might be far advanced, and in flower, but until the flower is cast, so as to expose the fruit in embryo to the action of the air, the apricot tree would not be injured by the frost. He ascribed the effects produced under changes of temperature in part to electric changes, so that the thermometer is not a sure indication of the effect which such changes will produce upon vegetation.

Mr. Carpenter said that in places where the trees were sheltered from the morning sun, as in a valley facing the north, the thermometer might sink to 20 degrees below zero without destroying the peaches.

GRAPES—FOREIGN AND DOMESTIC.

Dr. Trimble read an extract from a letter inquiring whether the Golden Chasselas grape could be cultivated in the open air. His own opinion was that it could only be grown under glass.

The Chairman.—That is my opinion.

Mr. Pardee considered it a question of care, exposure and knowledge. If we have the proper protection from cold winds, and the sun after frosts, and will take pains with it, and if we know how to take care of it, when to uncover and when to protect it, we could raise not only the Golden Chasselas and the Black Hamburgh, but most of our foreign grapes, in the open air.

Mr. Carpenter considered foreign grapes as of no practical use in this country. They might grow in some sheltered situations, but would generally mildew and die. While we have such natives as the Delaware, the Diana, the Rebecca, the Isabella and the Concord, it would hardly pay to spend time upon foreign varieties.

Mr. Pardee would not recommend any one to try to raise the foreign grapes unless he knew how, but it had been done successfully, and could be again. The Golden Chasselas had been successfully raised in the open air, by the side of a barn in Utica, and also in New York city.

Mr. Lawton said that he had repeatedly seen the Black Hamburgh, the Black Prince, the Golden Chasselas, and other foreign grapes, successfully grown here in the open air, producing the finest fruit. They require a different treatment, and will not

endure neglect, but with proper care every garden in this city could have its Golden Chasselas or Black Hamburgh trained up to the second story.

Mr. Cavanach, of Brooklyn, knew no reason why the Golden Chasselas should not be cultivated. A gentleman in Brooklyn intends to fence off his garden with board fences eight feet high, and place foreign grapes on their south side, and make a business of cultivating them.

Mr. Carpenter believed 99 out of a 100 would fail in cultivating the foreign grapes.

Mr. Cavanach would not advise any one to plant the Chasselas while we have the Delaware, Hartford Prolific, &c.

Mr. Roberts stated that Fowler & Wells planted a Golden Chasselas in 1855, which has borne every year since, and which has never been protected at all. For a garden, for variety, it might succeed, but he would not recommend it for a person wishing but one or two vines.

Dr. Trimble said that the grapes had failed in Europe for some years passed, and inquired whether that disease had followed them to this country, or whether the failure here arose from the extreme changes of our climate. This winter, in twelve hours, the thermometer rose from 7½ degrees below zero to 45 degrees above, and we have similar extreme changes in summer.

Mr. Andrew S. Fuller of Brooklyn, replied that the foreign disease had not followed the grapes to this country, but that the sudden changes in temperature were the cause of the failure. One hundred years thorough trial, every foreign grape having proved a failure, ought to be enough to satisfy anybody. We have 300 varieties of American grapes; and if that is not enough, we can sow the seeds and get as many more.

THE SPAN-WORM.

Dr. I. P. Trimble of Newark, N. J.—You have but few singing birds in cities, and for that reason caterpillars become very troublesome, and, unless checked by some Ichneumon, or parasitic insect, will go on increasing rapidly until famine does its work.

I have known some kinds of caterpillars in such numbers upon trees as to consume the foliage before they were fully grown, and in their attempts to reach other trees to be entirely at a loss as soon as they reached the ground,—their instinct, so surprising on other occasions, now entirely at fault. Their helplessness on the pavement was pitiable, and they soon perished.

In this city (New York) you have a caterpillar of this class,—the little span-worm, or Geometer. It is unnecessary to describe its personal appearance. This little worm, like many others, is something of a philosopher; it knows that if the wind should throw it from a high tree, and it had no means of breaking the force of the fall, it would be hurt. Now, to guard against any thing so unpleasant, it lays across its path, wherever it goes, a silken cable; push it overboard any where, and it will lower itself down deliberately and safely. It has also a kind of hand-over-hand way of climbing back again by the same cord. You may have noticed, also, that, when descending, they drop themselves a little way at a time, and then stop. These silken threads are spun from a fluid, and require some time to dry, otherwise they would not bear the strain.

Some of us in the rural districts of Jersey read the papers. Once last summer I noticed that the authorities were about to cut down the trees of this city to get clear of the worms. Now, nothing in your newspapers perplexes us so much to understand, as the accounts of your local government. At one time your aldermen are called the "forty thieves;" then they appear to have nothing to do but to seek out the nativity of a fat policeman; and lately they seem to have been mixed up with the Japanese ambassadors in some very queer operations; but when your city governors *do* order your shade trees cut down to get rid of the little caterpillars, we shall know exactly what manner of men aldermen are,—then we, who pay some attention to classifying the orders of nature, will know precisely where to place them.

These little Geometers, of your city, like most other caterpillars, feed upon leaves; they cannot live without them. They are born in the trees; leaves are plenty, they are all around them every where, and they feel no kind of hesitation about taking all they want. And why should they? Their mothers selected these trees for them the year before; and this selection is the result of an instinct the most wonderful of the world of wonders in which we live. She selects from the many those few trees to deposit her eggs upon whose leaves will put forth the next spring just at the right time to afford food for her little ones when they come out of the eggs. In other words, she knows how much caloric is required to burst the buds of trees and the shells of her eggs, and she puts *always* the right eggs on the right trees.

If you will now search the bodies of certain kinds of trees in your

city, you will find thousands of clusters of little eggs. Examine the elms, just under the large branches, where they go off from the main trunks, and in some places you may see the bark almost covered with them; and, if you let these eggs alone, you will find in midsummer, when you want the shade, these trees will be almost as leafless as they are now, and the little span-worms will be every where acting out Mahomet's coffin.

Man was created with dominion; but, if he does not choose to exert it, he should not blame the little insects. Had I a favorite shade tree coated over with these eggs, I would, within a month of this time, do something to prevent those eggs from becoming caterpillars. To tap each cluster with a hammer would do it—to take them off with a gouge or small adze, or to daub each cluster with paint, or varnish, or tar, would probably save the foliage of that beautiful tree. But nothing of this kind will be done here; and I shall have the opportunity next summer of seeing lots of these span-worms, and shall come on purpose.

The insectivorous birds in the country attend to the caterpillar business for us; but these birds will not stay with you. They do not like the noise, the smoke, and especially the boys of the cities.

These little span-worms, next summer, when they have eaten all the leaves they want, will choose others to make their houses of; for they belong to a large class called leaf-curlers; and this leaf-curling process, with some of them, is a very strange one. One much less than your span-worm, that lives on the plum trees, and wraps a leaf around it, so as to resemble a well formed segar, I have watched throughout the process with surpassing interest. I have seen this little speck of a worm take a calm survey of a leaf, then fix her cord on one side, then cross over, and then again and again, and then at different angles; and when some twelve or fifteen of these cords were arranged, she would go backwards to some distance, and with a single cord act upon all these other cords, as if by a combination of leverage, operating with a power utterly above and beyond any thing so minute a creature could accomplish unaided by such a combination of mechanical forces; and this will be repeated again and again, gaining a little every time, till the whole is completed. Sometimes her strength or her cordage is unequal to the work; then she will cut away the obstructing part, and try again. In a few hours the leaf will be curled; the overlapping parts will be neatly sowed together; the inside

will be lined with silk, composed, in a great measure, of the cordage she had used as an engineer. In a few days her limbs will have fallen off, and she will have assumed the pupa or chrysalis state, and appear dead; and in a few more days she will be a butterfly that flies at night—one that your lamp-light "leads to bewilder."

Once last summer, in crossing from Jersey to this city, a lady came on board the boat, with one of these little Geometers on her bonnet. The little thing seemed busy in measuring that bonnet; but it did not take long, and then it quietly perched itself upon the highest point. It was what is called a "love of a bonnet,"—very beautiful, but very small,—the lady herself was very beautiful also, but very large,—a perfect Juno in her style, and most elaborately clothed in silks. She cast a hasty glance at her fellow passengers; but the silk-worms had done much more for her than any of the rest of us. Thousands upon thousands had spent their entire lives in her service. She evdently felt how magnificent she was, but probadly did not ascribe it to the little caterpillars that had made her silks.

Probably, to show how gracefully she could do it, for one moment she bowed down that beautiful head upon her beautiful hand. That removed the obstruction from the little Geometer, and, quick as wink, it was down opposite the Lady's eyes; and then there was a scream. We heard the word "mercy" sharply and distinctly. Then there was a sensation, and a rush; but no collision. A friend of the little insect took it out of harm's way, and all became quiet.

Napoleon said, on a memorable occasion, that it was but a step from the sublime to the ridiculous. Napoleon was mistaken. It is not quite so far. The distance is the first leap of the spanworm from the topmost peak of a lady's bonnet of the present fashion, exactly to her eyes.

Those of you who are unable to study nature in the country, may, if you choose, have some compensation here. Study this little Geometer; watch the various stages of its transformation from the caterpillar to the butterfly; examine the case in which it is inclosed when in the chrysalis state; then turn to your drawings of the processes by which the ancient Egyptians embalmed their dead; place one of these little cases by the side of the sarcophagus, and see the similarity of the marks to the hieroglyphics that were intended to tell the story of the dead. See, if you can

the young butterfly emerge from that case; see how she takes advantage of the power of gravity to aid in the expanding of her beautiful wings; see her daintily flutter about in this world of ours, which "she scarcely deigns to touch,"—a thing of beauty—and contrast her with what she was—the "great, ugly worm,"—and then read the poetry and study the mythology of the ancients with a better understanding.

Dr. Waterbury said that he thought the books were in error in saying that the span-worm undergoes its metamorphose in the ground. He had never found it descending the web; and believed their descending was an accident.

Mr. Carpenter recommended a solution of 1 pound of potash in a gallon or 6 quarts of water, to be applied at this time of the year by the hydropult, to the trees, for the destruction of all kinds of insects that infest the trees.

Mr. Fuller said that 1 pound of potash to 4 quarts of water would injure young limbs; but with 6 quarts of water, the solution may be thrown over all the limbs of the tree without burning the bark.

Dr. Trimble advised caution in using quack applications. Many insects are useful. They are a part of God's creation to make the earth perfect. We should first find out what insects to destroy, and then how to do it.

MANURES AND THEIR APPLICATION.

Mr. Solon Robinson read an extract from a letter from a gentleman in Wisconsin, who proposes not only to dispense with manures but with plowing. His theory is that the granules of the soil and the seed granules form a battery, and that the disturbance of the former is just as truly an injury as the breaking of the latter, and leads to the exhaustion of the soil. Hence it is that in artificial culture the soil is so soon exhausted, while forest trees may continue upon it for ages without exhausting it. He also asserts that leaving the land naked by plowing is an injury, that it should always be covered.

Mr. Gale considered the last idea as the only valuable one, and spoke in favor of topdressing immediately after the ground is denuded by taking off the crop. He would never draw manure but once. Thousands of tons of straw are burned every season, which might much better be put upon the land, and thus we might have wheat after wheat year after year. One field has

yielded a crop of wheat every year for sixteen years, with but one plowing. Clover is sown with the wheat, and then turned under for the new crop.

Mr. Carpenter considered surface manuring far better than plowing in or even treading in, even if it is concentrated manure and a dry season. The earth is so powerful an absorbent of ammonia that none would be lost.

Dr. Trimble concurred in recommending topdressing, he also read a statement of the opening of the Raritan and Delaware railroad to Squantum, in the immediate vicinity of the marl pits.

Mr. Carpenter considered the marl as useless upon clay lands, but it might be useful for sandy lands, where clay could not be easily procured.

Mr. Henry said that as long as the law of capillary attraction remains unchanged, he should recommend plowing in all manures. The tendency is towards the surface.

Mr. Pardee read further extracts from the Wisconsin letter. The writer objects to the common method of culture by plowing, because

1. It exposes the land to nakedness.

2. It violates the economy of nature.

3. It requires much more time.

4. It causes disease, by eliminating poisonous gases from the soil.

5. It buries the seeds of weeds, so that the birds cannot devour them.

6. It is more expensive, requiring the removal of stones and stumps.

He had tried one method with success; applying a dressing of hot water at the time of sowing wheat or garden seeds, he had found at the same time to kill the weeds and grasses, and to hasten the germination of the seeds sown.

Dr. Waterbury thought the writer had begun his letter at the wrong end. The fact last stated might be found serviceable. He considered the question of top-dressing to be a mere economical one. If labor is scarce, and especially for grass lands, it may be the best thing that the farmer can do. This question will probably be solved in the dairy districts sooner than anywhere else.

Mr. Fuller was of opinion that top-dressing was good for some soils and not for others. And so with the marls and superphos-

phates. On certain soils they would entirely fail, while on others they might be useful. That marl contains everything needed for the vegetable, is not sufficient to recommend it, for the same may be said of granite. The question is the condition of these elements.

Mr. Gale said that if an empty barrel is turned over upon the earth, and left for a few days, the earth will absorb all offensive odor from it; showing that the earth actually absorbs the ammonia from the atmosphere above it.

Dr. Waterbury said that mulching the ground was an advantage, but that no top-dressing would cover one-tenth of the land. The two leading soils upon which he would recommend top-dressing, were, 1st. A soil so stony that it could not be plowed; and, 2d. A soil so wet that it could not be plowed.

On motion, the club adjourned.

March 11, 1861.

Mr. Quinn, of Newark, N. J., in the chair.

Mr. Robinson exhibited specimens of everlasting flowers.

Mr. Pardee remarked that these flowers were well worthy of more extensive cultivation, being of every variety of color, and drying without fading, so as to last for five years or more. He stated also, that the heliotrope and perhaps other flowers will be restored even after having wilted, and will be preserved by burning or charring about half an inch of the end of the stem.

Mr. Fry exhibited models of a "steam horse of all work," for drawing gangs of plows, carriages on common roads, driving stationary machinery, or for any other purpose for which power is required. One model was especially designed for watering, or spreading liquid manures. In plowing the furrows follow the wheels, so that the ground is left perfectly light, without even a footstep upon it. He stated that with this machine it would cost but one-eight as much to plow the western prairies as at present.

Mr. Solon Robinson read various queries, from correspondents, replying to them seriatim:

1. Is sunflower seed of any value, besides feeding poultry? He would advise it to be planted merely in waste places. It has been grown for an oil crop; but corn will pay better, even for oil, than the sunflower.

2. Wanted, a plaster for outside stone walls. Two good coats

of water lime cement will make a plaster that will stand a great deal of beating storm.

Mr. Adams suggested two or three coats of paint.

3. Are hemlock posts as durable as chestnut? Decidedly no.

Mr. Pardee—They are just as durable if kyanised.

WHEAT WEEVIL.

4. Wanted, a remedy for the wheat weevil. Wheat must be threshed as soon as harvested; and if it can be thinly spread on sheets or a clean spot of earth in the hot sun, and then stored in bins or casks, it will not be likely to be troubled with weevil. Stored in casks, and covered with powdered lime, it will be preserved from the weevil, and the lime can be winnowed out when the wheat is wanted.

Dr. Trimble, of New Jersey, said that the first line of this answer was all that was wanted. If the pea is stung it must be used at once, after the crop is gathered, for if left until spring the egg is hatched and the weevil feeds upon the inside of the pea. So with wheat. He considered the lime useless.

Rev. Mr. Weaver stated that he had known the weevil to be nearly driven out of a large barn by sprinkling quicklime through it when it was empty, and believed that further applications would have entirely driven them out.

Mr. Robinson said that he knew that wheat stored in a bin, with lime, as described, would prevent the weevil, although the barn is entirely infested with weevil.

Dr. Trimble said, that the question could not be so readily settled. The Hessian fly has sometimes been so numerous as almost to obscure the sun, and the next year they have been utterly destroyed by the Ichneumon fly. It cannot be driven out by lime or any other application. Unless destroyed by the Ichneumon, upon a certain day they will leave the barn in a crowd, and go to the growing wheat and deposit their eggs. This they do twice in the year.

Rev. Mr. Weaver said, that the Ichneumon fly might account for the weevil's disappearance in a section of country but not in a particular barn.

Mr. Robinson said that salt would preserve corn from the weevil, not because it destroys them but because they don't like salt, and will not go into a crib when the corn is salted.

The Chairman said that he had known peas to be preserved from the weevil by salting them in the barrels.

Mr. Fuller said that the peas and grain are stung when green, so that if salt prevented the weevil it must have been by killing the insect.

ROSE GRUB.

Dr. Trimble read a query, from a correspondent, as to the remedy for the insect that eats the rose leaves in summer.

Mr. Carpenter said that the slug came upon the upper side of the leaf about four o'clock in the afternoon, and could be easily destroyed by powdered lime,

Dr. Waterbury said that the term "slug" was not properly applied to insects but to molluscs. This is a grub, becoming a miller after its metamorphosis.

Dr. Trimble believed that the lime did not hurt them a bit. They fall from the leaf to the ground, penetrate it, and the next summer come out in the form of a fly.

BOTS IN HORSES.

Dr. Trimble read another query, as to the cause and cure of bots.

Dr. Waterbury said that the bot-fly lays its eggs in the summer upon the fore legs of the horse, which the horse works off with his teeth and swallows. The eggs are hatched within the horse, and are transformed to the fly in the manure heap. Bots are caused by an inordinate development of these larvæ; but the reason for the delay of the eggs in passing through, and for the inflammation, he could not give.

Mr. Gale had seen the stomach of a horse eaten through, in a case of the death of the horse from bots. His plan was to keep the horse in good condition, giving him salt frequently, and if eating much grain, throwing in a little ashes with his food. The bots were probably inordinately developed by the morbidness of the stomach.

Mr. Henry said that if milk and molasses are given to a horse troubled with bots, they will leave the coats of the stomach to feed upon them, and alum will then cause them to pass off.

Dr. Trimble said that the eggs are probably hatched upon the fore legs of the horse, and, causing some irritation there, are licked off to allay the irritation, and are thus carried into the stomach. So long as the horse is well fed, they are no injury to

it; for they feed upon what the horse eats. But if the stomach becomes empty, having nothing else to eat they attack the coats of the stomach, which produces irritation followed by inflammation. Give some sweet apples, or some molasses and water, and they will change their food, and the horse will be cured.

MANURES AND SOILING.

Dr. Waterbury called up the question of soiling, being one branch of the question for discussion; and said that by this means men with small farms would be enabled to keep an almost unlimited amount of stock.

Dr. Underhill said that for considerably over 20 years he had pursued the system of soiling, keeping his cattle in the yard, or permitting them to go a short distance for drink, but never turning them out to graze. By this method, where land is very high, he had been able to raise a considerable number of cattle and horses, and at the same time to carry on a successful fruit culture; which he could not have done with the ordinary method. It is necessary that the materials taken from the soil in the crop should be returned to it; and to depend upon the market to supply this exhaustion, is a poor resort. In order to farm successfully, the manure must be husbanded. He had found no manure equal to the compost produced by the mixture of the decomposed vegetable matter found in the alluvium, with the offal of animals. With half a dozen cows and four or five horses, more manure may be made than many farmers make who have a hundred cattle. By soiling, upon a few acres of land a large amount of stock can be kept with the aid of root crops, which are indispensable. When the green clover and other crops are gone, we have the turnip, carrot, parsnip, mangel wurtzel, and sugar beet. Where land is cheap, soiling may not be necessary; but where land is valuable that system must be adopted. There are those who lay up ten thousand bushels of these roots for the winter. Giving the white turnip seemed to be an unfair way of watering the milk; but with rich turnips, carrots and other roots, we may make the milk and the butter what we desire. Carrots are excellent for fattening animals; but for the last week or two, he would recommend Indian corn or Indian meal. For bedding for cattle, there is nothing better than the dried leaves of forest and ornamental trees, which may be packed into a very small space, and make excellent manure. He had tried all the new-fangled manures, and some of them were excellent as containing one or

two ingredients wanted; but the compost heap furnishes all the requisites for vegetation.

Mr. Robinson read a letter from Charles Sears, of Riceville, N. J., in relation to the marls of that State. Although the marls when excavated are very little soluble, atmospheric agencies act upon them, and they become soluble. The potash cannot be leached out from them, because it is in combination with silica, and no economical means have yet been devised for separating them. A result of the slow solubility of the marl is that unconsumed portions remain in the soil for future use. The vital power of the plant-root coming in contact with it effects its decomposition. Where it can be applied at a moderate cost, no better means can be used for improving the land than the judicious use of the green-sand marl.

Mr. R. proceeded to say that having been told that cattle would starve to death upon white turnips, he had tried the experiment upon two cows, giving them scarcely anything but the red strap white turnips, and instead of being in a starving condition, the butcher is negotiating for one of them.

Mr. Carpenter stated that the turnip crop alone in England the last year was worth $1,500,000,000. For pasturing a cow an acre of land is required; whereas, by soiling, three or four cows can be kept upon the acre, upon timothy; and corn soiling he considered still better. And although the pasture land is kept in better condition, yet the advantage far counterbalances this, so that as land rises in value we shall be compelled to adopt the soiling system. We can do without hay, using rootcrops and cornstalks.

Dr. Waterbury quoted the saying of Daniel Webster, that "the way to improve land is to raise turnips." When so many cattle are kept, the soil can be easily kept good by top dressing. In pasturing, much fodder is trodden down and wasted, and in July, August and September, the pasture is too dry. In the soiling process, the pasture is always green.

Dr. Trimble was opposed to soiling. There is no danger of manure becoming scarce while we have the marls of New Jersey.

Mr. Lawton thought that the continued use of marls alone would ruin the soil.

Mr. Fuller was in favor of putting manure into the soil, under the soil, and not upon the top. For orchards and vineyards, he

would not use top dressing, and would like to know what crops or what soils required it.

Mr. Gale would not give 10 cents a bushel for roots, to be hauled by himself for a mile. He would rather have one bushel of corn than ten bushels of turnips, for feeding cattle.

The subjects for the next meeting will be "Root crops and surface manuring." Adjourned.

JOHN BRUCE, *Secretary pro tem.*

March 18, 1861.

Dr. R. L. Waterbury in the chair.

THE NOVELTY CHURN.

Mr. J. E. Walter exhibited Cornell's churning machine, which is adapted to producing the temperature of 62°, at which the best butter can be made, and to the thorough aeration of the milk. The churn being supplied with sweet milk, and brought to the proper temperature by hot water poured into the lower chamber; butter was produced in 2¾ minutes.

FRUIT BASKETS—VENTILATION OF FRUIT.

Mr. L. F. Pingree exhibited a specimen of Cook's fruit basket, which are constructed of splints of bass-wood, so as to secure not only elegance of form, but free ventilation. If the berries are picked whole they can be shipped any reasonable distance with safety.

Mr. Carpenter mentioned that he had received strawberries from Boston in tight boxes, and they seemed to keep better than in open baskets.

Mr. Robinson.—The tight boxes are almost exclusively used in Boston, where they have tried both plans; and that Prof. Mapes pursues the same plan; the result being favorable to that process.

Mr. Pardee.—The condition of fruit determined the question whether it was safe to put it into tight boxes or barrels. If apples are put into tight barrels while in the sweating condition, they might rot in forty-eight hours. But if they have passed through that, and become dry, they will keep best in tight barrels for a certain period, when sweating will again take place. Fruit needs careful watching, or fruit which has been bruised or begun to decay will infect and destroy the whole.

Mr. Robinson.—The same truth applies to all kinds of fruit.

After apples have undergone the sweating process, they may be packed in tight barrels and transported two or three hundred miles with perfect safety. But if left there, they will almost invariably rot when the second sweating takes place. But if opened, and spread, and dried, a second time, and repacked, they may be shipped to Liverpool, and will keep sound. The period of this sweating varies with the season and with the kind of fruit, from three days to three weeks, and perhaps longer. This is the great secret in keeping all kinds of fruit. In strawberries, the sweating will take place in a few hours. If they are then opened, exposed to the air, and thoroughly dried, they will bear transportation better than if at once boxed up when picked.

Mr. Smith, of Conn., stated that a neighbor of his put his apples, when gathered, into barrels made perfectly tight, and they will keep until July. For peaches, he was satisfied that air was necessary.

Mr. Carpenter.—It may answer for winter apples, but summer or early fall apples, if put away in air-tight barrels, will rot.

Mr. Pardee.—The apples which are kept until July would probably sweat sufficiently in the few days which might elapse before putting the heads in. He had found that by picking his strawberries between 3 and 4½ o'clock in the afternoon upon a dry day, placing them in common house bowls and covering them with strawberry leaves, as soon as the dew began to fall, he could carry them twenty-three miles to Rochester the next morning, and they would be as bright as the strawberries picked there that morning. Take the best barrel of apples you can find, and put a decayed one in the centre, and they will not keep a week.

Mr. Carpenter said that the sweating is an evaporation from the fruit in the curing process, and differs from the condensation of moisture upon fruit brought in a warm room in cold weather. The latter may occur frequently, and will do no harm unless it is allowed to remain upon the fruit.

Mr. Gale would attribute the decay of fruit to the state of the atmosphere, rather than to air-tight barrels, or to open barrels. If apples are taken from the tree early in the fall, and placed at once in air-tight barrels, they will be endangered if left until February even. Russets can be kept until July in the open air.

Mr. Lawton attributed the second sweating to the rising of

the moisture from the interior of the apple to the surface, and being then exhaled after a sufficient time has elapsed.

Mr. Pingree coincided with the theory of sweating; but for small fruits, such as strawberries, he thought it desirable to send them to market before the sweating process commences. If a sufficiency of air is furnished to berries until they are exposed in the market, the sweating process does not take place at all.

Dr. Waterbury explained the sweating process, as a process of vitality. There is a continued exudation from the fruit, while ripening, as while growing. He would prefer the square form of boxes for packing, to the form of the baskets. One advantage of these baskets would be uniformity of size; for the ordinary baskets differ so much that we can never know when we buy a basket of berries, what is its capacity.

SALT FOR CATTLE.

A letter from Mr. Sprague, of Iowa, upon the practice of giving salt to farm stock. Until the last year, while keeping over a hundred head of cattle, he had followed the practice of salting them regularly. But the experience of the last year had satisfied him that cattle do not require more salt than is contained in the food they consume.

Mr. Robinson stated that he had himself wintered a large herd of cattle, sheep, and horses, without salt, and they never did better. Salt he considered unnecessary for the stomach of man or beast.

Mr. Carpenter had adopted the same principle; not having salted his horses or cows for three years. Neither did he salt his land, or his hay. His horses had refused to eat salt hay.

Dr. Trimble said that whether salt was necessary or not, it would not be contended that it hurt the cattle, and it pleases them, and gives pleasure to the farmer. The cattle will leave the best feed to come for the salt, and it may be a means of making them more tame. He would recommend giving salt at least once a week to horses and cattle.

Mr. Smith was in favor of placing the salt where the animals could help themselves when they please.

Dr. Waterbury believed in giving animals all the salt they want, in the first place, because they like it; and he knew no indication safer to follow with regard to the well being of any animal than the inclinations of that animal. He might draw up

a theory of how an animal should be treated, and the animal might live under that presumption; but he thought it would do better to have its own way. In the second place, he would give animals salt because a certain per cent. of the blood of the animal is salt; and the animal must have the means of furnishing that saline basis to the blood. The bile is based upon soda; and there is no other source from which this soda can be obtained than salt, the chloride of sodium. No doubt an animal can live without extra supplies of salt, but it is better to give it all it desires.

Mr. Pardee.—Would you carry out the same principle with regard to children?

Dr. Waterbury.—I would.

Mr. Pardee.—Suppose they had a love for intoxicating drinks?

Dr. Waterbury.—They do not.

Mr. Pardee.—It may be inherited; and Mr. Robinson says that this is an acquired appetite, as the desire for intoxicating drinks is acquired by man. If it is an intoxication shall we indulge them in it?

Dr. Waterbury.—It is necessary first to show that allowing an animal all the salt it wants is injurious to it?

Mr. Smith suggested that the birds which inhabit the guano islands have nothing but salt.

Dr. Trimble said that the hunters in the west were familiar with the fact that the deer flock to the salt-licks; and thus they take advantage of this natural propensity in finding their game.

Mr. Lawton had given salt to his cattle for twenty years, without injury. If the salt is a stimulant, it must be a very harmless one.

Mr. Robinson said that there are millions of acres and hundreds of miles where there is no salt which the wild cattle can get, so that a great many animals never have any, excepting what is contained in their food. It would be just as reasonable to give animals lime because it is an element of their bones, or glue because it is an element of their hides, as salt because it is an element of their blood.

Mr. Quinn.—If land is deficient in salt, the plants grown upon it will be deficient in salt, and then it will be necessary to make up the deficiency by salting the cattle. In New Hampshire, the cattle suffer from the bone disease, from a deficiency of lime in the soil; and bone meal is given to them to cure the disease.

Mr. Bergen said that it seemed to be a settled fact that the bone disease is caused by a deficiency of lime in the soil. If there can be a deficiency in one article of food, there may be a deficiency in another; and we can no longer infer that nature provides in the plant everything necessary for food.

Dr. Waterbury said that the phosphate of lime was first given to ricketty children. The evidence of its assimilation was not so forcible as is desirable. The great objection to giving salt seems to be the notion that no mineral should be taken as food. The majority of animals live in salt water, so that it cannot be very poisonous.

Mr. Gale said that in Long Island, where the sea air is filled with salt, cows will not eat it. Nature demands salt, and if the farmer in the country, keeping a dairy, should omit to salt his cattle for three weeks, the women would remind him of it; for they say that if the cows are not salted the butter will not come. Our lands will not grow wheat without adding lime, where the soil is deficient in lime. And if salt is deficient in the soil we should apply it there as we apply the lime.

MANURES.

Mr. Quinn stated his views with regard to the management of manure. No manure is more within the reach of every farmer than barnyard manure, and none is more shamefully mistreated and mismanaged. We everywhere find it exposed to the sun and rain, the gases valuable to the farmer escaping into the atmosphere, and the soluble portions leached out and carried to the river or to some uncultivated valley. There should be a barn cellar or other covered receptacle for all the manure, liquid and solid. The escape of the gases can be prevented by sulphuric acid, or by sulphate of lime. It would be the best plan, if practicable, to apply manures fresh, and plow them under. But in this form the manure cannot be appropriated by the plants, and the farmer loses control over it. Having provided a receptacle, the next thing is to provide, if practicable, at a cost not exceeding a dollar a cord, swamp muck or peat, to compost with the manure. Any special manures which may be desired, may be added to the heap. Deep culture is important, in its relation to manure; for it is found that when the soil is thoroughly disintegrated to the depth of 15 or 18 inches, it will require less manure than if it is plowed only 6 or 8 inches deep.

Dr. Waterbury said that where the American practice differs decidedly from the English, the better way is to follow our own, because there is some reason in our climate, soil, or other conditions for that difference. The English use manure more fermented than we do; and the reason is that they have no Indian corn crop, which will consume the manure in any condition, and for which the manure gains nothing by fermentation. Again, composting adds nothing to the value of manure. We can add nothing to the value of a crop of clover. If we pass it through the bodies of animals, we depreciate it to a certain extent. Again, forest leaves are a source of manure peculiar to this country. We can use them instead of muck. Instead of decomposing manure, he would preserve it with the least possible decomposition until it goes into the plant.

Mr. Quinn inquired how corn could get hold of the end of a straw and draw it up and assimilate it.

Dr. Waterbury—While the straw lies surrounded by an atmosphere of carbonic acid gas of its own creation, no decomposition will take place; but if the corn root enters that atmosphere, it takes up that carbonic acid gas, and the decomposition goes on. A corn stalk of the previous year, under a new corn hill, will be decomposed, while elsewhere it will be hardly affected for a whole season.

Mr. Smith took pains to keep his manure under cover, and to keep it from fermenting, and when applied to the land, to plow it under as soon as possible. Dried leaves are valuable as manure, but green crops he considered valueless for turning under. He believed that diseased cattle came from the practice of this system of soiling.

Mr. Robinson inquired whether it was not cheaper to buy corn meal and feed it to cattle, or even to spread upon the ground, than to buy guano: taking corn meal cheap from the west and converting it into green corn for the New York market.

NEW SUBJECTS.

The subjects selected for the next meeting were: "Barn yard manures and their substitutes," and "The planting of seeds."

On motion the Club adjourned.

JOHN BRUCE, *Secretary pro tem.*

March 25, 1861.

Mr. Edward Doughty, of Newark, N. J., in the chair.

CLOTHES WRINGER.

Mr. E. Dickerman, of the Metropolitan Washing Machine Company, of Middlefield, Conn., exhibited the "Universal Clothes Wringer," a machine of his own invention. He explained its adaptation to the object designed. It consists of small elastic rollers through which the clothes run, and the water is thus pressed out of it without any straining of the fabric. The elasticity of the rollers makes it suitable for garments of all sizes. It will wring four times as fast as can be done by hand. By placing a tub on each side, and running the fabric through the rollers backward and forward, it can also be used for washing.

PRESERVATION OF APPLES.

Mr. Lawton said, that in consequence of the remarks at the last meeting, in reference to the sweating of apples, he had been induced to inquire into the principles of atmospheric action. He read, as pertinent to the subject, extracts from an article in the Farmers' Magazine, of March, 1861, showing that water does not, as once supposed, exist in chemical combination with atmospheric gases, but in a state of steam. There is an insensible evaporation from the earth, taking place under all circumstances and in all weathers. It is seldom interrupted, but continues even when rain is falling or the ground is covered by snow. In the coldest weather a block of ice will grow porous from this cause without any signs of liquefaction. The sweating of apples he considered the result of this imperceptible evaporation, and however dry they are put up it must take place. After being taken out and wiped dry, they become sweaty a second time. This evaporation will always go on independent of the evaporation in the air.

RENOVATING OLD ORCHARDS, AND SURFACE MANURING.

A letter was received from Mr. P. Whittier, of Chesterville, Maine, upon the subject of renovating old orchards. This gentleman recommended the mulching of the roots of the trees. He had successfully treated a small orchard of very old trees in this manner: He had hauled about the roots of the trees all the coarse vegetable substances that he could get. His trees had leaped into new life, they had put on a deeper green and larger leaves, made a large growth of wood, and had been loaded with fine fruit.

Limbs nearly dead sent out shoots two or three feet in length. Baldwins, which usually bear only every other year, had been loaded with fruit three years in succession. This treatment not only benefited the orchard, but the land as well, and grass was gradually taking the place of the brakes that formerly grew there. The mulching process also protects the trees from drought and from sudden changes in the atmosphere. This is the way that nature, in forests, prepares the soil for the growth of trees. If any of the soil is left uncovered it should be near the trunk, while it is well to mulch fifteen feet from the tree. A ton of straw was worth more than five dollars to put into an orchard.

Mr. Carpenter said he had always been an advocate for mulching trees, and had practiced it with great satisfaction. He had used barnyard manure and straw, preferring the former. He had not found that it increased the insects in the ground at all.

Dr. Waterbury believed that if an orchard was on ground that could be cultivated, it was the better way to do it. As for the manure, the roots of the trees needed something to make wood of, so he put on ashes. There must also be carbonic acid gas in the soil. Any kind of wood plowed into the land would decompose and generate this. The best article to use for the purpose is shavings; first plow a furrow nine inches deep, throw in the shavings, and then plow another furrow to cover them, and they are ready to renovate the orchard. Then instead of losing the soil you have got the use of it. You can put on a crop of potatoes, and take it off, with little or any injury to the trees, while the working of the soil will be an advantage. In an old orchard it is necessary to cut many of the limbs from the top, and these, after lying in a pile by themselves, will be sufficiently decayed to put upon the ground again.

Mr. Smith of Connecticut, said that he had an orchard which he could not very well till, and he had it grafted for two successive years, and he had left the branches on the land. He also put on ashes and guano. The brush would catch the leaves as they fell, and the mass lying on the ground renders it light and mellow. This method saves the trouble and expense of carting.

Mr. Quinn thought that no one could afford to mulch trees with barnyard manure, and that a cheaper material would do as well. He had used charcoal, cinders and salt hay. He covered a space about the size of the top of the tree. In the renovation of trees

it was necessary to clean the bark. He used soda wash for the purpose.

Mr. Carpenter said that if an orchard had been neglected for many years the roots were near the surface for feed, and by trying to renovate them by deep plowing, the trees would be injured. He had seen orchards ruined in this way. If the land had been plowed once every two or three years, the roots were out of the way. In manuring young orchards he thought it better to use barnyard manure notwithstanding its cost. He had always had much success in pruning trees severely.

Dr. Waterbury considered it a wrong idea that when a tree was dying it could be saved by pruning. In transplanting, it was necessary to cut the top a good deal.

Mr. Gale said he was perhaps the strongest advocate in the club for covering the ground, and he did not want to see the idea cramped down to orchards. If this system of placing manures upon the surface of the soil were adopted it would double the value of agriculture in a few years. By this system the intense heat of the sun is kept from the earth, and the moisture there is not drawn away. The world does not know yet the value of moisture in land. Manure should not be drawn but once, and then out upon the land. In hot weather land is deteriorating unless it is covered up. If a person has had a brush heap in his field, in plowing the lot he can tell when he strikes that spot with his eyes shut, it is so soft and moist. The speaker was convinced that the more the thing was experimented upon, the more would men become convinced of the policy of carting manure in the first instance on the land where it is wanted.

Mr. Pardee said that in these discussions the difficulty was that people in advocating a theory pressed it too far. For instance, Mr. R. L. Pell always urged that an orchard should never have a crop upon it, and yet in visiting his place the speaker had found that Mr. Pell was cultivating potatoes in his very best orchard. There is no theory in reference to the management of a farm in which you do not come nearer the truth by striking a balance. It is possible to almost ruin an orchard by plowing it, yet no one doubts that plowing is often an advantage to an orchard. A man should have some judgment before he goes on to a farm, and should consider the peculiar circumstances in the case in judging of the course of labor to pursue. It may be that mulching will be better for an orchard; but, taking into

consideration the value of the potato crop, the farmer may consider it better to plant one.

Mr. Adrian Bergen said that even when the trees were large and nearly touched each other, a crop could be raised, as the sun would strike the ground at one time of the day if not at another. It might be a poor crop, but was better than none.

Mr. Smith said that in an orchard where one wanted to plant a crop, and the ground was hard to plow, it was sometimes a good plan to plant artichokes and let hogs dig them; thus keeping themselves in good condition, and working over the ground at the same time. He also made his hogs work over his barnyard manure, and when they got so lazy that they would not get up and work he killed them. The pastures of our country are growing poorer and poorer. He recommended the putting on of ashes or plaster, and the sowing of rye with grass seed. If foxtail was too heavy plant red-top. In this way, in five years, such a field might be renovated, and the pasture would keep green until frost came. If there is any profit in keeping stock, it is by having good pasture.

Dr. Waterbury related as an example that, in discussing here, we often see things from different points of view; that ashes were useless on clay soil, while on a sandy soil they were excellent. In some sections of the country also, ashes are too dear to be used freely.

Mr. J. G. Bergen said that perhaps, in the same way, different methods of treating old orchards might be better on different soils. In regard to plowing orchards—when they had been regularly plowed every year they would stand very deep furrowing. In the case of a few trees in a garden, mulching might be a good practice; but he thought that in a farm of twenty acres it would be found more economical to plant potatoes.

Mr. Smith said that by far the best crop for a peach orchard was buckwheat.

Mr. Robinson said the theme of the day was "surface manuring," and the discussion had partly run into this subject.

Mr. Fuller said this subject was proposed by him at the last meeting, because he wanted to get information on it. He wanted to know what were the results of applying manure on the surface. He had found in some cases that it induced mushrooms to grow, and, last year, he had a lot of currants ruined by fungus in this way. He had sometimes found mulching beneficial; but

by mulching for two years, all the insects known to the country would be harbored in a field. He thought the best practice in an orchard was to stir the soil by the use of a cultivator.

Mr. Carpenter said his experience was in favor of surface manuring for dwarf pear trees. If the manure was dug in deep the roots would go down to it, and, not being exposed to the changes of the weather, would continue to grow, and not be checked in season. The result is that the young wood is not ripened. In regard to plowing in manures, in other cases, he thought a great loss was sustained by putting volatile manures on the surface in hot weather. All agreed that surface manuring in the spring is advantageous, but he believed in getting it mixed with the earth to some extent or with something that would hold it; earth, perhaps, was as good as anything else. If used on the surface, the ammonia of manures would escape,—still it should be near the surface. For several seasons he had noticed persons plowing manure in corn fields, while he sprinkled it—not using near as much. The corn in the fields where manure was plowed in would come up and struggle a long time, sometimes be injured by worms, and not reach the manure until late in the season, so that the crop was very poor. His own corn, where the manure had been sprinkled, would bear well. Lime, ashes, plaster, and manures of that nature, are heavier than the soil, and need no plowing, because they sink down of themselves. He recommended plaster and ashes for potatoes.

Mr. Fuller said that some had asserted that manure should be dissolved in water so completely that its presence could not be discovered before being put on land.

Mr. Quinn said there was no doubt that it was good policy to dissolve manures. He did not advise the use of unfermented barnyard manure near the roots of a growing plant.

Mr. Fuller thought manure applied when dissolved in too much water would drown out a crop, and nothing but water plants grow.

Mr. Gale thought liquid manure the best. He did not mean dissolved as thin as water, but as we see it run from our farmers' barnyards—a waste of gold. Mulching is the next thing to that,—but not in the spring of the year,—put it on in the fall and take it away in the spring. The plants have then got all they want during the winter, and the spring rains have leeched it; or, if there are no plants, the ground is impregnated with

He did not sympathise with this talk about losing manure by evaporation. If it went into the air it came back again.

Mr. Fuller.—Yes, but then it may come on some one else's lot.

Mr. Gale said what evaporated did not go above the atmosphere, to heaven. Nature puts all her manures and seeds on the surface. He had seen sometimes where manure had been put in a corn hill, and a drought coming on after a month or two the manure would be then dried in the hill. If this had been put on in a dissolved state or earlier it would not have been so.

Dr. Waterbury said that sometimes it depended much upon the fact that farmers were hurried in getting in their crops, that they were obliged to manure afterwards upon the top.

The same question was continued, with the addition suggested by Mr. Pardee, of "spring fruits and flowers." Adjourned.

JOHN BRUCE, *Secretary pro tem.*

April 1, 1861.

Judge R. S. Livingston in the chair.

FRUIT BUDS DESTROYED.

Mr. Carpenter.—Owing to the severity of the frost in the fore part of March, the peach buds and cherry buds have been destroyed in many localities. Where the orchard was not exposed to the morning sun, he had found the buds uninjured.

Mr. Lawton had found his trees uninjured. His plan had been to plant three or four hundred peach trees every season, and when they have yielded one or two crops to cut them down for fire wood. He did not expect a crop oftener than once in three or four years. He did not consider a peach tree of much more importance, in Westchester county, than a hill of corn, it is so easily produced and so little to be depended upon.

Dr. Trimble had had his peaches and apricots escape for a series of ten years; while his neighbors lost two crops out of three; his orchard being shaded from the morning sun. If the thermometer sinks more than 18 degrees below zero, at any time in the winter the buds will be destroyed, and with a less degree of cold in the spring or fall.

Mr. Carpenter believed that the thermometer might sink more than 20 degrees below zero without injury to the trees, if shaded from the morning sun. He had had trees escape with the ther-

mometer about 30 degrees below zero. The tree grows through the winter, as can be easily proved by measuring the trunk or limbs.

Mr. Gore had saved his peaches by watering the tops of the trees before sunrise, after severe cold; his neighbors having had no peaches that year.

Dr. Trimble remarked that the frost never left the ground upon Mt. Lebanon, so that the famous cedars of Lebanon must grow while the ground is frozen.

HARDY HERBACEOUS PLANTS.

Mr. Fuller read the following paper:

There are, doubtless, many persons who are very fond of flowers, that would cultivate many more than they now do if they could have them without the trouble of preparing beds and sowing the seeds every season. Besides this trouble there is another which deters many from growing flowers altogether, that is, the uncertainty of getting good fresh seeds. Annual flowers are certainly worth cultivating, but it must be acknowledged that there are very few of them that are superior, if equal, to our best perennial varieties.

When we have obtained a good variety of perennial plants, although they may cost a little more at the beginning, we have a permanent thing, one that can be depended upon from year to year, without the trouble of renewing every year as with annuals. I will remark as preliminary to giving the list that although the plants named are all hardy in the vicinity of New York, yet they will bloom earlier and better if they are covered in winter with leaves, straw, or any coarse litter, just enough to shade them, say two inches thick is all that is necessary, for it is not the cold that destroys them so much as it is the sudden changes which are so common in this latitude. The following fifty varieties we have cultivated several years and believe they will gratify those who will endeavor to cultivate them:

	Botanical Names.	Color, &c.	Hight in feet.
1.	Aconitum Bicolor	Blue and White	3
2.	Aconitum Nepallus	Blue	4
3.	Achillea Rosea	Red	1
4.	Achillea Ptarmica Plena	Double white	1
5.	Arabis Alpina	White and yellow	$\frac{3}{4}$
6.	Campanula Carpatica Cerulea	Blue	$\frac{1}{4}$

Botanical Names.	Color, &c.	Hight in feet.
7. Campanula Carpatica Alba	White	½
8. Campanula Persicifolia Alba	Double white	2
9. Campanula Persicifolia Cerulea	Double blue	2
10. Chelone Carbata	Orange and scarlet	3
11. Cypripedium Spectabile	Red and white	2
12. Delphinium Hendersonii	Large deep blue	3
13. Delphinium Formosum	Blue and purple	3
14. Delphinium Album	White	3
15. Dictamnus Fraxinella	Red	2
16. Dictamnus Album	White	2
17. Dielytria Spectabile	Red and white	2
18. Dodecatheon Meadia	Light and purple	1
19. Epilobium Angustifolium	Purple	2
20. Galardia Aristata	Yellow	1½
21. Iberis Sempervirens Alba	White	¾
22. Linum Alpinum	Blue	1
23. Lupinus Polyphyllus	Purple	2
24. Lupinus Polyphyllus Alba	White	2
25. Lychnis Chalcedonica Plena	Double scarlet	3
26. Lychnis Chalced'a Alba Plena	Double white	3
27. Lychnis Flos cicula	Double red	1
28. Orobus Vernus	Purple	1
29. Œnothera Missouriensis	Yellow	1
30. Papaver Cracteata	Red	3
31. Papaver Orientale	Red	3
32. Penstemon Pulchella	Purple	1½
33. Phlox Stalonifera	Red	½
34. Phlox Roi Leopold	Red and white	3
35. Phlox Suavelens	White	2
36. Phlox Napoleon	Shaded red	–
37. Potentilla Russeliana	Scarlet	2
38. Statice Latifolia	Lilac	¾
39. Spiraca Aruncus	Yellowish white	4
40. Spiraca Venusta	Red	4
41. Spiraca Ulmaria	White	2
42. Spiraca Japonica	White	1
43. Spiraca Variegata	Yellowish white	1
44. Spiraca Filapendula Pleno	Double white	1½
45. Scutellaria Japonica	Blue and purple	1
46. Saxifraga Aizoon	White spotted	½

	Botanical Names.	Color, &c.	Hight in feet.
47.	Sedum Siebaldii	Pink	½
48.	Trollius Europeus	Yellow	1
49.	Uvularia Perfoliata	Pale yellow	1
50.	Veronica Incana	Blue	2

CULTIVATION OF ANNUALS.

Mr. Thomas Cavanach, gardener of Brooklyn.—Floriculture, as a branch of horticulture, is more or less within the reach of every individual who has a single rod of ground. That part of floriculture which affords the greatest amount of pleasure with the smallest means, is the cultivation of annuals. Almost every one can find leisure to sow a few seeds and watch the young plant bursting through the earth, sending out its beautiful foliage, and see the delicate bud opening with its rich glowing colors, amply repaying the care and attention bestowed upon it. For those who are changing their residence from year to year and do not wish to purchase expensive plants, we would advise them to plant annuals. Annuals are classed as hardy, half hardy, and tender. Hardy annuals are sown in the autumn or early in spring; half hardy are sown in the open ground in May; tender annuals are very sensitive of cold, and should be sown in pots in the house or in a hot bed, or if sown in the open ground they ought not to be planted before the first week in June. Previous to sowing annuals the ground should be rich and well pulverized, as many of the seeds are small, requiring a light, rich soil to enable them to germinate freely. Many persons think that when they make a hole in the ground with a trowel and throw in the seed, perhaps mignonette, that it is sure to grow; whereas, if it does not, they generally lay the blame upon the seed and find fault with the seedsman for selling them worthless seed, when in nine cases out of ten the fault is their own in sowing too deep. The proper depth for planting flower seeds depends upon the size of the seed to be sown. Lupins and sweet peas may be planted one inch deep, but small seeds, as portulæ and mignonette, require to be sown almost upon the surface of the soil.

Some seeds are difficult to germinate. Cyprus vine requires to be soaked in warm water about one hour; the seeds of the Globe Amaranthus are covered with a thick woolly substance, which greatly retards germination, and if planted without soaking few if any will come up. The most convenient method of sowing

annuals is to take a round-pointed stick, with which draw a circle six or eight inches in diameter and from one eighth of an inch to an inch deep, according to the size of the seed, placing a label with the name on in the center; the labels should be five or six inches long, painted white and marked with a lead pencil before the paint is dry. Larkspur and many of the hardy annuals when sown in autumn, lie dormant all winter, making much stronger plants and flowering earlier than those sown in spring. The dwarf rocket larkspurs when sown on the edges of the borders present a most beautiful sight with their various colors; seed requires to be sown in October, and protected by a slight covering of straw during winter. Phlox drummondii, all shades of colors, delights in a moist situation; seed sown one-eighth of an inch deep in May, blooms from June until October. Nemophilla insignas, or blue love grove, a very pretty dwarf plant, likes a rich soil and moist situation, suitable for vases. Aronia umbelata, a very pretty annual, with long trailing stems, bearing beautiful lilac and white flowers, very fragrant, suitable for vases; the seed may be sown early in April, flowering in June. Aster chinensis, or china aster; this beautiful annual comprising over twenty-five different varieties. Truffants, cultivated by Truffaits at Versailles, in France, for general cultivation is the best, on account of the beauty of its flowers and the variety of its colors; seed sown in the open ground in May, in rich soil; all single or semi-double flowers should be pulled up and thrown away. Calliopsis, or coreopsis, this is a very showy annual; fourteen different varieties; flowers bright yellow, mottled with a rich velvety crimson, highly ornamental; seed may be sown in October, or early in April; easily transplanted. Balsams, or ladies' slipper, a well-known tender annual. The camelia-flowered contains twelve varieties, of all shades of colors, variously striped and mottled; seed sown in the open ground the latter part of May; to have them early, the seed should be sown in pots in the house in April, and transplanted to the garden when four inches high; plant singly, pulling up all single or semi-double flowers. Cuphea platycentra, a very pretty annual, or greenhouse perennial, with scarlet and purple flowers, suitable for vases, flowering all summer and winter, if taken up and kept in the house; seed may be sown in pots in the house in April; plants may be procured from any florist for a trifle. Cyprus vine, a splendid running vine, delicate foliage, bright crimson flowers of a star shape.

Alba, pure white; seed requires to be soaked in warm water before planting; seed sown one-eighth of an inch deep, in the latter part of May.

A very ornamental pyramid may be made by placing a hoop, three or four feet in diameter, fastened to the ground by pegs, setting a straight pole six or eight feet high, in the center, running a string from the top of the pole to the hoop. Sow the seed outside the hoop; it may also be trained over arches or vases. Sathgrus odoratus, or sweet pea, one of the prettiest and most fragrant of the popular annuals which ornament the flower garden. The sweet pea grows four or five feet high in rich soil. The plants should be tied to a stake or old tree. Seed sown in April flowers in July. Ageratum Mexicanum, a half hardy annual, with light blue flowers, indispensable; seed sown in May flowers in July, flowering profusely until killed by the frost in autumn. Alyssium Maretimum is a hardy annual, growing one foot high; flowers white, very fragrant; seed may be sown in autumn or early in spring. Cacalia or scarlet tassel flower—a very pretty annual, with scarlet and orange tassel-shaped flowers; seed sown first of May blooms from July until October. Escholtzia or California gold flower; flowers bright yellow; very showy; this, with slight protection during winter, will flower the second season; blooms from June until October. Clarkia elegans is a hardy annual, very showy; seed sown in September flowers much better than when sown in the spring; for spring sowing, plant in April, in poor soil. Clintonia elegans is a beautiful, tender annual, covered with deep blue flowers; grows about six inches high; seed sown in May in light, rich soil, blooms in July and August. Gomphreana globosa, or globe amaranthus, five different colors; seed rather difficult to vegetate unless soaked in warm water; the flowers, if gathered and kept in a dry place, will retain their colors for several years; seeds sown in May flowers in July. Mignonette, one of the sweetest of all the annuals in the markets of Paris and London; thousands of pots of it are sold annually; it has been found growing upon the walls of old ruins near Paris, springing from every crevice where the seed could germinate, and scenting the air with its fragrance. The mignonette is of very easy culture; in rich soil it grows luxuriantly with poor flowers that have little or no fragrance; but in poor soil the flowers will be large, and very fragrant; when once the seeds are planted it will retain possession of the

soil, springing up year after year; seed sown in May, almost upon the surface of the soil. Among the curious annuals is the mimosa, or sensitive plant; this singular plant closes its leaves upon the slightest touch.

> "Weak, with nice sense, the chaste mimosa stands,
> From each rude touch withdraws her tender hands."

Seed sown in the open ground in May, in rich soil. Mesembryanthemum, or ice plant; this curious plant has thick leaves, which have the appearance of being covered with ice; very ornamental for vases; seed sown in May. Loasa Acanthifolia, a running vine, with curious yellow flowers; the stem and leaves are covered with hairs or small bristles, which, on being touched, leave a stinging sensation similar to nettles; seed sown in May. Coix Lachryma, or Jacob's Tears, a kind of ornamental grass; it is called Jacob's Tears on account of its shining, pearly seed, which, by a considerable stretch of the imagination, may be likened to a falling tear; seed sown in May, half an inch deep. Anagalis or Pimpernel, a dwarf trailing plant, with blue and pink flowers; the Anagalis has been termed the poor man's barometer, on account of its closing its flowers at the approach of rain,

> "The walls are damp, the ditches smell,
> Closed is the blue eyed pimpernel."

Not only does the pimpernel close its flowers, when exposed to damp air, but many other plants are equally sensitive. Stellaria media, or chickweed, and many others, close their flowers at the approach of rain. Mirabilis jalapa, commonly called four-o'clocks, from closing its flowers in the evening. Mirabilis is a Latin word for wonderful. The roots of this plant, when dried, form the principal constituent of the jalap of druggists; it is generally considered an annual; it has large tuberous roots, which, if taken up in October and stored in a dry cellar, will flower the second season; seed sown in April flowers in June. Zinnias, one of the most showy annuals in cultivation, flowers brilliant scarlet, orange, white and light purple; seed sown in May blooms in July.; easily transplanted. The new doubled-flowered zinnia makes a splendid addition to this variety of annual flowers; the petals are imbricated like a double French marigold. When annuals are grown in masses, a very pretty effect may be had by planting two or three varieties together; thus, the scarlet, blue and white, produced by the scarlet verbena, nemophilia insignis, and sweet alyssium, the verbenas forming the outline, the alyssium next, and the nemophila in the center, forming a perfect star-

spangled banner. Orange and blue may be produced by the escholtzia and convolvulus minor, the escholtzia forming the outline of the bed, the convolvulus being planted in the center.

Mr. Carpenter encouraged the cultivation of flowers, and referred to the dwarf rocket larkspur, as a most beautiful hardy annual, for a spring flower.

Mr. Pardee again called attention to the everlasting flowers, among which are the Helichrysum, in varieties, and the Acrolineum Roseum. In the cultivation of flowers, ladies are apt to seek too great a variety, and thus fail to learn their habits and meet their wants. Some flowers such as the balsam and the rose, will bear any amount of enrichment of the soil, while others fail under such treatment. A large proportion of flower gardens fail in consequence of putting in unfermented manure, which is rank poison to flowers. Manure should be used as fine as powder, and the soil should be forked over repeatedly before planting.

Mr. Adrian Bergen, of Long Island, considered some of the old fashiond flowers as handsome as any. He had roots in his grounds that had been bearing for fifty years. A flower garden is so attractive that it will be observed by every traveler, and make even a humble cottage an attractive home.

Mr. Robinson stated that the mignonette furnishes a better bee pasture than any other cultivated plant. It is superior to buckwheat, because it produces a better flavored honey.

MANURES AND THEIR APPLICATION.

Mr. Fuller read the following paper upon this subject:

Mr. Quinn, at our last meeting, said that it did not depend so much upon the quantity of manure applied to the soil, as it did upon its quality and divisibility. He is correct, and if we would pay more attention to distributing manure through the soil so that a portion of it would reach every rootlet of the plant, we might produce better crops with a much less quantity of manure. It is this that gives liquid manure its great value over other manures, for it is in a form to reach every portion of the roots. But liquid manure is not the best in all cases, neither is its application practicable or economical under all circumstances. If all of our soils were porous and dry, and we could have the apparatus necessary for applying it at the proper time, (and that would be when the plants were growing the most rapidly,) then without doubt the best mode of applying manure would be in a

liquid form. But it so happens that our soils are not all gravelly or sandy, nor all underdrained; therefore it is not policy in all cases to undertake to reduce our manures to a liquid form before using them. Besides in some seasons many of our crops (for instance corn) receive more moisture in the form of rain than they need, and to apply any more, would be injurious.

If all soils and every season were precisely alike, and all plants required the same treatment, then we should soon discover how to be always successful. But they are not, and we find them as diversified in character as men are in their opinions in regard to them. From this, we learn that we are controlled in a great measure by circumstances, and that adaptation is one of the principles of agriculture and horticulture.

A manure that is beneficial upon one soil might be positively injurious upon another. Ashes are very beneficial to nearly all sandy soils, and valueless, if not injurious, upon all clay soils, simply because one of these soils needs the potash, while the other does not. While ashes assist the sandy soil in retaining moisture, which it so much needs, it would do the same on the clay soils which have too much already. Again, a soil that would grow a certain kind of crop in this latitude to its greatest perfection, if removed to Georgia might be almost worthless for the same crop, because in this climate we would seek a soil that was dry and warm, while in Georgia we would want for the same crop a soil that was moist and cold. They who have studied the cultivation and adaptation of the different varieties of fruit for both of these latitudes will understand this better than others. The sôil may be composed of the same ingredients in both localities, but its productiveness depends upon the condition of these ingredients, whether they be coarse, or fine, soluble or insoluble.

This principle should guide us in applying manures to all of our crops. If we have a soil that is too compact, and underdraining does not make it as friable as we desire it, then we may add coarse manures, and they will be beneficial as a divisor, in addition to the amount of plant-food which they contain. For this purpose, barn-yard manure is perhaps the best, and muck the next in value—for muck is not only a manure in itself, but is a powerful absorbent. It lasts a long time in the soil, and improves the texture of all soils, except those that contain it originally. Muck becomes the most valuable when composted

with manure; but it often occurs that a man has no manure, or not enough to make it worth the trouble of composting it with a large quantity of muck; and in such a case we would apply the muck (fresh, not salt) directly to the surface of our land, and, if it is a friable kind, harrow it over until it is reduced to a powdered state—then plow it under. If it is compact, and the harrow does not readily pulverize it, then the roller should be passed over it until it is crushed.

There is but little danger of injuring any dry upland soil by applying much of it pulverized before it is plowed under. Salt-muck from the sea-shore should be composted with manure, and not used until it is two years old; then it will be found to be as good, if not better, than that from fresh pond. There is enough of this manure around Long Island and New Jersey to make them the richest farming lands on the globe. These sandy soils need this kind of manure to make them more retentive of moisture, and we hope we shall see the day when the farmers on these sandy plains will learn the best mode of applying these inexhaustible beds of muck, which are nothing less than mines of gold waiting to be coined into a circulating medium by the farmers of these localities. In applying muck or other manures, we believe that it is best to mix it with the soil instead of putting it on the surface, as advocated by some at the present time. If these manures are spread upon the soil in the fall, and plowed under in the spring, before a crop is put in, then we have but little objection, but we do not call this surface manuring. When manure is applied to the crop after it is put into the soil, and allowed to remain on the surface while the crop is growing, then we call it manured on the surface, or surface manuring.

A top-dressing to meadows is very beneficial, especially if given in the fall; but if the land had been made as rich as it should have been before the grass was sown, there would have been but little need of giving it a top-dressing of anything except some concentrated manure or plaster, which could have been sown as easily and with as little expense as it would be to scatter a field with grain. To make a practice of applying coarse manures upon the surface of an orchard or vineyard, we believe to be a very imprudent operation, if not an injurious one, for it induces the roots of the trees to grow near the surface, where they are destroyed by the heat of summer and the cold of winter, and the feeding roots become annual productions instead of peren-

nial. Mr. Carpenter says that digging the manure into the soil deeply causes the roots to penetrate deeply, and this is the cause of many of our trees making a late growth in the fall. This may be the cause of late growth, but from our observations, we conclude that in most cases it is caused by surface roots springing out late in summer, induced by the manure being too near the surface; and, of course, these roots are the most active at the very time when the tree should be ripening its wood and roots preparatory for the winter. This is one of the reasons why we disapprove of applying any coarse manure to the surface of an orchard or vineyard. Another is, we do not like to furnish a protection to all those noxious insects that infest the orchard or garden, and seek the earth for a habitation in winter.

Volatile manures should always be applied with an absorbent, or be immediately put under the surface. In those manures generally termed ammoniacal, such as guano, &c., the value lies more in some other ingredients than it does in the volatile ammonia.

Those who have made a practice of composting their manures have learned the difference in value between fresh fermenting manures and those that have become concentrated and non-volatile. On retentive soils manure may be applied months before the crop requires it for use, without its losing much of its value. But it is generally best to apply it for annual crops only a short time before planting. Lime, ashes, plaster, salt, &c., of course, we would apply on the surface, for the first shower would carry them down to the roots. The application of manures in a concentrated form is very beneficial in some cases, and we think would be found very valuable in fruit culture if the orchardist would learn how and when to apply them.

We do not believe in any universal manure, but we do believe that barn-yard manure is as near it as any we can get; yet we have known many cases where it has failed entirely to bring about the desired results—such as growth, fruit, &c.,—and yet by a free application of some one of the simple elements contained in it an entirely different result was produced. This only shows that there are some plants that require manure in different proportions than they get from barn-yard manure. For instance, we know of a man who had a large number of quince trees which fruited for a few years after being planted, and grew finely at the same time. The manure from the horse stable was given

them in liberal quantities, but they soon showed signs of failing and at last stopped growing and fruiting, and no amount of stable manure would start them; salt was then applied at the rate of one quart to each tree, scattering it all over the ground. The result was the trees made a fine growth the first year, and the next they produced an enormous crop. Now these trees had been receiving the saline properties in the manure, but the quince being what is called a marine plant, did not get salt enough until it had received a special application. In another soil, perhaps the stable manure would have been all that the plant required.

We have many cases around New York and Brooklyn where land had become, by repeated doses of stable manure, incapable of producing any of the various crops generally grown in this vicinity. It had become too rich in nitrogenous manures, and therefore failed to produce anything above the lowest order of weeds. But when an application of lime is given these soils, they immediately return to productiveness, and will grow enormous crops. There are multitudes of cases where applications of special manure is the only resource left us for bringing our lands back to their original productiveness. The superphosphates may be applied to almost any crop, or upon any kind of soil, yet there are some cases where their use would be more beneficial than in others; and this is what we must learn, what all should learn who cultivate the soil, when and how manure should be applied to bring the largest returns upon the labor and money expended.

Mr. Robinson. The original question has not yet been answered, "What shall I purchase to fertilize my land? what is the most economical manure? shall I purchase cattle and use barnyard manure? shall I buy oilcake, or cornmeal or bran to put upon the land? or shall I buy them and feed them to cattle? What is the best economy?"

Dr. Trimble said that Egypt had supported the densest population and been the granary of the world for a series of years, the lands being annually enriched by the overflowing of the Nile. So important did they consider irrigation, that they constructed an enormous lake, by which the country could be inundated if the periodical overflow of the Nile should fail to occur. But irrigation cannot be applied everywhere. Some lands can be redeemed by lime and clover; others by gypsum. Guano can be used where heavier manures cannot be easily transported. Muck is sometimes valuable. It may be hauled upon the land

and placed in a heap and left exposed to the weather, and if it will benefit the land the effects of it can then be seen. When it is found to be beneficial it can be spread over the surface. Analysis of soils had not furnished any great beneficial results. If land can be so far renovated as to produce clover, it is the fault of the farmer if he does not keep it good. Marl he had recommended so often that he would not say anything about that.

Mr. Lawton moved that Prof. Mapes be invited to deliver a course of lectures upon the subject of manures.

Mr. Pardee seconded the motion, and it was agreed to.

Prof. Mapes accepted the invitation, with the understanding that his lectures should precede the regular subject for discussion.

The subject selected for the next meeting was "manures and spring planting."

Adjourned.

JOHN BRUCE, *Secretary pro tem.*

April 8, 1861.

Mr. Wm. Lawton, of New Rochelle, in the chair.

FROM THE LONDON FARMER'S MAGAZINE, MARCH, 1861, ON RAIN WATER, &C.,

By Cuthbert W. Johnson, F. R. S.

Size of rain drops, one-twenty-fifth to one-third of an inch in diameter, the shape is spherical.

Water enough to cover the earth with *five feet* annually, is chiefly taken from the *torrid* zone, and distributed in proper proportions by the atmosphere. It is said that the evaporation in Calcutta is fifteen feet annually, in the Bay of Bengal one inch daily.

The composition of the atmosphere, at a mean pressure, is as follows:

	By weight.	By measure.
Nitrogen gas	75.05	75.55
Oxygen gas	21.00	23.32
Aqueous vapor	1.42	1.03
Carbonic acid gas	0.08	0.10

We all know how promptly this aqueous vapor can be seen, by pouring cold water into a glass it will be immediately condensed on the outside.

Water does not (as once supposed), exist in chemical combination with atmospheric gases, but in a state of steam. "It has been shown, long since, that the amount of steam existing in a given space and temperature, is the same whether that space be free from, or filled with air." The aqueous vapor of the air constitutes a distinct and independent atmosphere, the elastic force of which forms, at different temperatures, different proportions of the elastic force of the whole.

For example, at the temperature of 65° it gives to the air 1.50th of its elasticity. A volume of air or gas, at any temperature, saturated with moisture, contains as much steam as would exist, at the same temperature, in a vacuum of the same extent.

The insensible vapor in the air is merely mechanically mixed with the atmospheric gases, there is no chemical combination. A diffusion of water, in a state of steam, by evaporation from the earth's surface is seldom interrupted, continues often when the rain is falling or ground covered with snow, under a burning sun or in eternal ice fields.

Evaporation continues in *heat* or *cold*. Snow, or a block of ice, when the weather is intensely cold, will diminish under the action of the air, without the least signs of liquefaction on the surface.

The inference is, that the same quantity of vapor is formed from snow and ice as would be evaporated from water, if water could exist as a fluid below the freezing temperature.

Plants of all kinds exhale moisture largely; the transpiration of plants increases progressively from March to August, and after that time declines. A cabbage, under favorable circumstances, has been found to emit, daily, water equal to its own weight.

Such are the sources of the vast fountains of vapor which replenish the atmosphere with water, for distribution, laden with ammonia, in clouds, in dew-drops and in rain.

Thus the relations of earth, sea, air and atmosphere may be considered as a great fabric for the dispersion of light and heat; upon its proper working depends the wellbeing of all the animal and vegetable kingdoms, its movements are not left to chance, but are guided by harmonious laws, perfect and eternal.

Mr. Solon Robinson said he had several interesting letters from correspondents in the country; one of them communicated copies from the London Times and Bell's Weekly Messenger, in relation to the potato disease, and giving Professor Bohlman's discovery. Both remedies are well authenticated; remedy No. 1 was taken

from the "Bristol Times" (England), and the other one from a letter sent to the Royal Agricultural Society. No. 1 is from a letter written by Mr. Miles to the editor of the Bristol Times, and says that Prof. Bohlman, of St. Petersburg, Russia, accidentally discovered a remedy which has stood the test for seven years. In the autumn of 1853, the Professor received a new variety of potato highly recommended; and the specimens he received were placed upon the stove (the large earthen stove of Russia), and forgotten until the planting season, when they were shrivelled up very much and some of them charred. But they were planted, and produced a remarkably fine crop, which was entirely free from rot, while other potatoes were very much diseased. This induced the Professor to adopt the expedient of drying, and immediately on being dug he submitted the entire crop to a high temperature. In 1855, he repeated the experiment, and again in 1856, with the same results, the potatoes being free from disease. In 1858, he erected a drying house upon his estate, and his example has been followed by several large landed proprietors. Mr. Miles further states, that as soon after digging as possible, the potatoes were to be dried in single layers, removing each layer as soon as the tuber became shrivelled up, and replacing them with others.

Remedy No. 2, was practiced by Mr. Leonard Short, gardener to John Milford, Esq., England. As soon as he perceived the leaves of the potatoes were attacked, he immediately covered them with earth, leaving the roots high and dry. The consequence is, every tuber remains perfectly sound. This remedy is applicable in every variety of soil. Mr. Short planted two acres of potatoes in 1856, in stiff clay soil; early in April they were hand-hoed; in June they were well earthed up with a double-breasted plow; about the first of August, a single furrow was run between the rows completely covering the vines, with a few exceptions. On digging up the crop in October, all those tubers that were covered were entirely sound, while the few not covered were entirely diseased and useless. Mr. Robinson said, these cases seemed to be so well authenticated and verified he thought they better be put upon the records of the club.

Mr. R. G. Pardee presented two apples, and said he would like to know if any of the club knew what they were. They were brought to him from Clinton, Oneida county, and were celebrated for their keeping sound till late in June. They were called the

"Kirkland seedling," a seedling planted by old Dominie Kirkland, missionary to the Indians about 1800. Grafts could be procured by sending to E. P. Powell, Clinton, Oneida county.

Mr. W. S. Carpenter said it appeared to be a very fine apple, the flavor was very good, and he should consider it a valuable addition.

Mr. Pardee said that if eaten or bitten by mice in the cellar, this would not destroy the apple as the remainder would remain sound.

Mr. Carpenter said in regard to the proposed remedy for the potato disease, by drying, that it was nothing new; it had been tried in this country and failed to some extent; and it appeared to him the theory was wrong. If the potato was dried, the watery substance must be taken back again before it could germinate. He was in favor of a rotation of crops. It was a settled fact with farmers, that potatoes could not grow well many times in the same place, they were more liable to decay. He thought that our success in preventing this disease depended upon a rotation in crops. He made it a rule to buy potato seed at a long distance from home, and he was more successful with his crops than his neighbors.

Dr. Trimble said the rotation had nothing to do with it; this was a specific disease, and we want to know what it is. That is the question; then, perhaps, we may find a remedy. Some say it is an insect in the plant, on the leaf, or on the tuber. We do not know what it is; a change of land or manure does not affect it.

Mr. Lawton said he agreed with the gentleman last up; he didn't think there had been the slightest approach to the cause of the disease.

He had brought some cuttings of the Althea Frutex, which was a beautiful flower, though it had no fragrance. This was double Althea, white and red. It may be pruned to almost any shape. It comes forward late in the season, but retains its bloom and foliage to a late period, and is free from insects.

Mr. Robinson said that Mr. R. Adams, on the north shore, at Pillar Point, Jefferson county, had succeeded in protecting his young apple trees by planting at the same time with the apple tree, a gooseberry bush on the south side of each tree. The bush seemed to operate as a natural mulch, and prevented sun

cracks. A lady correspondent had planted poppies with onions, and they proved a sure preventive of the onion maggot.

Mr. Allen, also of Pillar Point, had succeeded, by the aid of gearing, in churning with the old dasher churn in fifteen minutes, by wind power. Another correspondent, in Vermont, wished to know where he could get some Japan wheat, and if it was as good as recommended. He should answer publicly that there is a great deal of humbug about this Japan wheat; like the Hungarian grass. He preferred the Java wheat which originated from a single seed found in some Java coffee.

Dr. Trimble presented some pieces of grape vine which were girdled last summer in order to increase the size of the grapes. Above where it was girdled, there was a large increase in the size of the vine.

PROF. MAPES' LECTURES ON MANURES.

The subject of manures was then taken up, and Prof. Mapes called upon.

Ladies and Gentlemen:—I have been requested to address you on the subject of Fertilizers. It is somewhat difficult to arrange this subject so as to complete any section of it in a single lecture. A question has arisen concerning the comparative value of different manures, but that can only be given by showing their relative value as fertilizers, and cost of transportation, in various parts of the country. Thus, in many districts you cannot procure salt as a manure, while in others you can get it for an almost nominal price. Another difficulty which presents itself to me is, the impossibility of treating of principles in repetition with each manure. Therefore, I propose speaking to-day of certain principles in relation to the action and value of manures, reserving for the next two lectures, special fertilizers, and the consideration of each manure separately.

Until a very recent period, you have been under the impression that an analysis of manure defines its value; more recently, however, it has been well established that this is not true. The analysis of a manure simply points out its constituents, but does not tell us the condition of these constitutents, or whether they are in a state to be appropriated by plants at all. I have lately seen an experiment that settles this question; one specimen of guano, and another of super-phosphate made of phosphatic rock treated with sulphuric acid, and another of calcined bones treated with suphuric acid mixed with sulphate of ammonia, were

sent to a chemist who has been, until recently, acting as an inspector of manures in one of our States. He valued one manure at $63 a ton, another $40 per ton, and the third at $16 per ton. The one he valued at $63 is of no value as a fertilizer, being that made from the rock; while that rated at $16 is worth more per ton, practically, many times more than the one rated at $63.

A vessel was sunk some time since, near Baltimore, and afterwards raised; the cargo was phosphate, and was analyzed to enable the Insurance Company to ascertain its value; the chemist estimated it at $10 a ton; it was sold at auction for $11 a ton. The buyer of that cargo, guided by his experience in using it alongside of other fertilizers, the next year paid for the same class of manure, $55 per ton; showing that his experience was entirely opposed to the result obtained in the analysis.

The error concerning the value of analysis, I at one time shared in common with all, and, in my practice, mistaking my premises, believed I was proving it to be true. That is, after making an analysis of the soil, and adding the constituents which existed in the least quantity, I realized increased crops, but failed to observe that the materials I added were very differently *conditioned* from the same materials, as usually found as components of the soil. In an argument against the analyzation of soils brought forward some years ago, the writer stated that the rich and fertile soil of the Miama Valley was, by analysis, the same precisely as a sterile soil of a certain portion of Massachusetts. It was advanced that the Massachusetts soil was coarse and pebbly, while that of the Miami Valley was a fine rich debris. Experiments were then made, by grinding these pebbles down to the same texture as the Miami soil, and it was then tried in pots, but proved still to be a barren soil compared with that of the Miami Valley. This was considered by many at that time, as a decided refutation of the arguments in favor of analyzing soils and fertilizers; and I think I shall be able to demonstrate to you, during my remarks, that the value of a manure will depend upon the condition of the constitutents rather than their relative quantities.

An analysis of a soil may show that within a depth of ten inches from the surface it contains potash enough for 2,484 crops; phosphates enough for 775 crops; lime enough for 35,388 crops; soda enough for 37,777 crops, and silex enough for 22,144,444, and so on, and yet that very soil may not be fertile, unless these same

constituents are added in different conditions, such as are found in barn-yard manure, etc.

We find lichens, mosses, and the lower class of plants growing from the surfaces of rocks, but on the sides of the mountain where, for various reasons, the debridation of the rock is more rapid, the debris will not sustain the highest class of plants. A single rose carried from there to a garden, or old soil, and duplicated in the usual way, will become a double rose. The cultivated double rose, however, if carried back to the fresh debris of the mountain, will pass back again to the original single rose; and it is so with the whole family of plants.

Now we find that after a time this debris, occupying the valley below and receiving the great variety of accumulation, becomes a fertile soil. It becomes so from the plants growing upon it being returned to and decaying within it; and it is fair to infer that the inorganic constituents contained in those plants, upon being restored to the soil, are more rapidly assimilated by a new growth.

We grind feldspar rock, containing 17 per cent. of potash, to a fine powder, and apply it to plants, requiring potash, and it will not fertilize them at all; but we apply potash, separated from wood ashes, and find it to be an excellent manure. Soil may be composed of debris from limestone rock, and yet need lime to enable it to raise crops. The action of limestone rock is also very different from that of carbonate of lime in other parts of the country. Some English chalk farms contain 40 per cent. of carbonate of lime, and are fertile; the Plains of Athens contain 40 per cent., and are fertile; but if we burn the limestone rock of Westchester county, and then expose it till it obtains carbonic acid, the chemist would pronounce it to be precisely similar to the English chalk; add 2000 bushels of this carbonate of lime to an acre of land in Westchester county, it will render it sterile for a century, possibly, though it is less than two per cent. of the weight of that soil, to the depth of twelve inches. Now, in the one case, the two per cent. of carbonate of lime renders the soil barren, and in the other that with 40 per cent., is fertile. The difference is in the condition of this carbonate of lime; though the laboratory would pronounce them to be exactly alike. Analytically, some specimens of granite correspond closely to the ashes of a cabbage; still, ground granite placed around a growing cabbage, will not increase its growth, while the ashes of burnt

cabbage, containing the same constituents as the granite, but differently conditioned, will do so very materially.

We make an analysis of barn-yard manure, and find a quantity of inorganinc matter; we may duplicate from the rocks the same constituents, separated from those rocks by the chemist, yet they will not possess the fertilizing powers of the former.

The same constituents which compose the green granules of the green-sand marls of New Jersey, at Monmouth, may be taken from the rocks in the neighborhood, and compounded in the same relative proportions, but they will not produce the same effect as the marls. Leached wood ashes, which have not only been treated with lime to make the potash caustic, but from which the potash has been separated entirely, will produce effects which no analysis of the leached ashes will account for; in certain districts the effects are wonderful. Now these leached ashes, on soil which contains a trace of phosphates, are of no earthly value; but on soil where you can find no trace of phosphates, they show very great effects; as would the same amount of phosphates taken from organic sources, and applied to that soil. Still you perceive it contradicts the analysis.

Now this green-sand marl only very recently has been discovered, within five or six years, I think, by Dr. Charles Enderlin, to contain a trace of phosphate; until that discovery we attributed the whole value of the green-sand marl to its potash. If you separate the green granules of this green-sand marl, by washing, the same way as you would separate gold from its sands, and present to the chemist the powder of feldspar rock at the same time, and ask him to pronounce upon the relative value of the two things as fertilizers, for plants requiring potash, he will report, if he rest upon the result of his analysis, and not upon any knowledge of a natural law apart from that analysis, that the feldspar is the most valuable, while in fact it is worthless; and the green granules, separated from the green-sand marl, are worth seven cents per pound on any farm in a district requiring potash. I do not mean the whole mass of the marl, but these separated granules. The feldspar contains the largest amount of potash; but the other contains that which is in the best *condition* to fertilize plants.

A farmer presents an ounce of soil to a chemist, who makes an analysis and finds there all the constituents required by plants; in presenting the result of that analysis, he is really presenting

the results which that soil is capable of producing, during all future time; whereas, the farmer can only make use of such constituents as are in a condition to be appropriated during the current course of crops. If it were possible for a plant to get all the potash that was in the soil, or all of any of the constituents, the whole globe would be transformed into organic life entirely too suddenly for our purposes.

The change of condition may occur in a great variety of ways. Every time either of these constituents enters into organic life and goes back to the soil it acquires functions which it did not before possess. Whenever any of the 64 primaries combine, immediately a new property, a condition or function is developed which did not belong to either of the primaries in its original condition. It is true that many of the proximates which are poisonous and many which are not, have the same constituents, but in different conditions. A man may drink dilute nitric acid, and he may drink a solution of sugar, ten seconds apart, and no oxalic acid will be formed; but let him pour them together before swallowing them, and he will experience the effects generally produced by oxalic acid—you add nothing to the sugar or the nitric acid—nothing is parted with, it is simply a change of condition, and the mixture has functions which it did not have before. So it is with every one of the 64 primaries, beginning at the time when our sphere was entirely rock; then these debris formed the soils which were moved and mixed by floods and other causes, until we have some soils representing many of the 64 primaries in the same field; others, where the debris of the rocks have not been so generally mixed by the floods, are deficient in certain constituents. We find in many instances that a soil contains a mixed quantity of constituents not in a condition to be appropriated by plants, and that by raising on it, and then plowing under, a particular crop, that these ingredients are progressed, and plants are enabled to grow, although nothing has been added of an inorganic kind.

By re-dissolving and crystalizing certain crystalizable materials many times, we may alter their powers to a great extent. The article known as Prussic Acid, a single drop of which will kill a man, may, if allowed to stand for a year or two in a hermetically sealed glass vessel through which the light can permeate, be swallowed with impunity; its functions are changed. We say it is decomposed, but nothing has been added or taken

away; the same ingredients are there; they are simply altered in condition.

We take a phosphatic rock, and a bone, heated to redness, and pulverize them, and submit the powders to a chemist, and he will say there is no difference. But place them before a cow having the bone disease, and she will lick up the bone dust and be cured; if her calf be toddling by her side, because its bones are gelatinous, and deficient in phosphate of lime, it will be relieved in a few days, by the use of the bone dust by the cow. The instinct of the cow appears to be superior to the knowledge of the laboratory; she will not touch the pulverized phosphatic rock. If you mix it with her food and pour it down her throat, it will pass from her without being assimilated at all.

You may find farms where the soil is made up in part by the debris of phosphatic rock, like many of those at Hurdstown; and we find that burned bones, treated with sulphuric acid, are the best manure that can be used upon that farm, yet its soil is replete with native phosphate of lime.

Therefore, I claim from this, and from many other circumstances, that a knowledge of the constituents of the soil, irrespective of the conditions of those constituents, is no guide to the farmer.

As one means of ascertaining the condition of any particular soil, render a portion to a fine powder, and boil it for twenty minutes in dilute acetic acid, then make an analysis of the supernatant fluid, and you will get those things that are in a condition to be appropriated by plants. Such an analysis might be useful to farmers. The old method is not of any avail, unless in adding some constituent which proves to be altogether absent from the soil, he supply it from a factory waste or from organic decay; he will then improve his farm, because he will use progressed constituents under the same name, but differently conditioned. This is the reason why a single gallon of ashes, resulting from a certain quantity of barn-yard manure, incinerated down to an ash, has a dozen times the value for raising a crop, of the same amount of chemically similar constituents in the soil.

We are often puzzled to know, when we look over an analysis of a manure, why it has furnished results so very superior to those obtained from other manures. Who does not know the difference between the action of the human fæces, and that of the lower animals? The former has ten times the value of the latter

as a fertilizer, yet the analytical difference shows no such inequality of the constituents. The explanation lies in the fact that the food of man is of a higher class of organic life. You may consider this to be a mere hypothesis. Be it so. In the absence of real knowledge, our only way is to take the most probable hypothesis and examine it thoroughly. Now I claim to have examined this subject for over twenty years; I claim by conforming to it, and by a selection of manures, to have produced effects greater than those produced by others around me. If this be true, it is probable that I am not entirely mistaken in my views. There is not a chemist in the world who can explain, on mere analysis, the difference between marble, chalk and limestone; yet marble, be it ground ever so fine, cannot neutralize acidity of the stomach, while chalk will do so at once. Pulverized limestone will not fertilize a plant at all, while the lime from oyster-shells, having progressed through organic life, is a valuable manure.

I claim that the only difference between the animal man, in his organic constituents, and the rocks which originally formed our globe, is that his constituents have been progressed in passing through the various stages of organic life, assuming new functions, and reaching a higher organism, until eventually they become a man. Whether you analyze the human or the lower animal, you will find nothing in either that you do not find in the rocks; the only difference is in the proximate conditions. When man decays he does not return to primary conditions, but back to certain proximate conditions of organic matter. If you throw a handful of wheat into a vessel of water, does it go back to its primaries? The grains first will swell up, then burst, and a white powder will settle to the bottom; another portion will remain held in semi-suspension by the water. That which precipitates is starch, that which is held in suspension is gluten. When the wheat passes into the stomach of the animal, we are told that the gluten goes to make muscle, and the starch to make fat. You will find the organic constituents do not differ materially; they are differently compounded, possess new functions, and assimilate in a different way, and, in this state, become food for plants without passing back to their primary conditions.

Barnyard manure does not by decomposition pass back to the primaries; but in all the stages it has occupied it makes a short halt; as does the wheat in its decomposition at the starch and

gluten. After a fortnight, at a temperature of 60°, both the starch and the gluten will commence to decompose.

The soil will present conditions more favorable to rapid decomposition, whenever the root of a growing plant is present. I think I shall be able to show you that water has functions when the root of a growing plant is present; just as different as a galvanic battery when its circuit is completed and when it is not. If you will analyze a bullock's blood, or, more properly perhaps, the blood of a man, you will find their constituents have the power of exciting vegetation, from supplying necessary constituents to insure growth that you cannot get from lower sources. These are higher than you would get if you used the very food on which that bullock fed; much higher than if you used the pabulum which created his food. You will find in the blood of man a certain amount of iron. Now, I claim that one grain of iron separated from the blood of man would have probably medicinally, and certainly in the propagation of organic life as a fertilizer, many times the power of a scale from the blacksmith's forge. The chemist would decide them to be alike.

Many years ago it was claimed that plants were sustained entirely by material in a proximate condition, but it was not defined what those proximate conditions were. At a later date, Liebig claimed that the same constituents that formed the ashes of the plant were its proper food. He also claimed that it was necessary to have an excitant to cause the plants to take up that food; and that ammonia was this excitant. He further claimed that this was furnished from the atmosphere by dews and rains falling through it, and that the decay of every organism furnished organic portions in a gaseous form to the atmosphere, while descending rain and dews brought them down to the soil, where they acted upon the plant as an excitant.

Some English chemists, wishing to seem original, and unwilling to allow credit to a German, commenced some fourteen years ago to attack Liebig; they said the value of manure was in proportion to the ammonia it contained. They went on till they convinced each other, and until I have heard gentlemen in this club asserting, that ammonia was direct food for the plant. But the doctrine they have advocated in England for fourteen years is now pretty generally abandoned. Liebig claimed that ammonia could be obtained, when the condition of the soil required it, from the atmosphere alone.

Now the truth, I think, lies between these theories. If you place upon a table four or five tumblers, and put an ounce of soil in each—then let the 1st tumbler receive nothing but water; tumbler No. 2, water with a drop of ammonia; tumbler No. 3, water, a drop of ammonia and a small quantity of common salt; tumbler No. 4, all these things, and a stream of carbonic acid running into the soil; tumbler No. 5, all these other things, with the root of a growing plant hung over and into the water, (introduced from a flower-pot beside it) and you then make an analysis of the contents of each. After a fortnight you will find in tumbler No. 1 nothing new; in tumbler No. 2 one portion of inorganic matter in solution; in No. 3 five do; in No. 4 twenty do; and in No. 5 one hundred; that is one hundred times as much inorganic matter as in No. 2.

You will therefore perceive that water mingled with ammonia has its power as a solvent of inorganic matter increased. Therefore, we find in under drained and sub-soiled land, a large amount of moisture condensed from the atmosphere, and of course a corresponding increase of ammonia.

I tried last year upon alternate strips of beets, celery and other crops, crystallized sulphate of ammonia in various quantities, leaving other strips between them without it. I should state to you that the soil upon which I experimented has been for many years thoroughly underdrained, and it is fairly charged with the inorganic constituents of plants in a progressed shape, but I could make no impression upon that soil in the increase of crops, by the use of ammonia. We all know that water falling through the atmosphere takes up carbonic acid gas and ammonia. The first half pint of water that falls from a roof at the beginning of a shower will be found filled with noxious gases; not the washings from the roof alone, but the washings from the atmosphere; and many persons have till-basins to catch this foul water. We all know, also, when the atmosphere comes in contact with anything colder than itself it deposits moisture, as is the case in thoroughly under drained lands. In such soils every drop of water so condensed must be replete with ammonia, precisely like the first pint of water falling upon the roof. The atmosphere is the grand vehicle in which all the decay from the surface of nature is held and carried about. The atmosphere, also, always contains moisture. There is the same amount of

water now upon this globe as there was at the time of Noah's flood; and if the earth be dry, the atmosphere must contain the moisture; it may be in the form of dew or vapor, but water is there, and so long as we can present colder surfaces, that deposit of moisture is going on. The amount of ammonia received upon an acre of land when it is properly sub-soiled and underdrained is many times as great as that contained in the amount of Peruvian guano usually applied to an acre of land. It is fifteen times as great as that contained in a usual dose of stable manure applied to an acre of land. This is not the case when the drain is shut at the lower or upper end, but when a drain is properly arranged, the whole land is charged with ammonia. At the same time it is true that if the plowing is only eight inches deep, you may not get ammonia enough to give to the moisture in the soil the power to change the condition of inorganic matter.

Every farmer knows that by leaving an acre of soil in naked fallow for a certain length of time, and disturbing its surface occasionally he can enrich it, and it will afterward bear crops which it would not before. Why? Has he added anything to it? No. Has he taken anything from it? No. What then? Why, the condition of the constituents of that soil has in a degree been changed, and therefore the potash which was contained simply in particles of feldspar, and the phosphate which was merely there as phosphatic rock have undergone a certain alteration of condition, and are rendered capable of being dissolved by coming in contact with proximates, which, by capillary attraction, traveled upon the moist surfaces of the soil. But he does another thing; he raises crops, and when the roots have penetrated into the sub-soil, and have taken up inorganic matter therefrom, he plows those crops under. In analyzing these there is nothing new found, but they have altered the conditions of the constituents appropriated; the potash is altered, and has new functions. It has grown capable of combining with silex to give strength to the straw of the grain. There was silex enough in the soil for a million crops, but it was not in a proper condition. When in another lecture I shall speak of potash as a fertilizer, this may be more fully explained; but it must now be evident to you that a soil though barren, may have chemically the same constituents and in the same relative proportion as one that is fertile. Then there must be a difference other than in the relative quantity of the constituents.

That difference is claimed by one set of theorists to be in *the condition of the inorganic matter;* and by another set, to be in the fact that it contains *ammonia.* I have proved by my own experiments clearly that where the soil is deeply and thoroughly disintegrated ammonia will not increase the crops. Therefore my claim in regard to the condition of the constituents I think is true.

I do not wish to occupy your time with various instances of changing the condition of these constituents by other processes than that of going through organic life. We do know that the presence of carbonic acid in soils increases the power of water as a solvent, and we also know that the presence of the carbonic acid is insured by securing certain conditions of the soil.

Dr. Waterbury said, if the subject of manures was up for discussion, he should object to some of Prof. Mapes' doctrines.

The President decided such a discussion out of order at this time.

ROOT CROPS.

Mr. Roberts moved to take up the subject of root crops. Agreed to.

Mr. Gale referred to the potato disease. Ten years ago he planted the finest and most perfect seed he could find, and for three consecutive years raised crops of improved quality, upon the same ground, while others were in the habit of planting the small and imperfect ones for seed. He thought more depended in such a careful selection of seed than upon any thing else.

Mr. Carpenter thought Mr. Gale's theory in part correct, but thought the soil had something to do with it. His experience had shown that potatoes planted in a dry soil were sound, when those planted in different soil decayed.

Mr. Bergen said, facts in this country and in Europe were contrary to the theories broached here; the only sure thing, and that was not sure, to prevent rotting, was early planting.

Mr. Mapes said, three years ago he hired a field of a neighbor, which was not under drained, adjoining a field of his own, which was thoroughly under drained, but neither field was wet; he planted potatoes of the same kind, and in the same way in both fields. The ones in his neighbor's field all rotted, while those in

his own were all sound, except a strip about eight feet from the fence. His nearest drain was forty feet from the fence.

The President thought there was a great deal in what was said about drying potatoes. Farmers used to cut potatoes and let the pieces lie till they dried before planting. If the water dried out of the potatoe, and it had to extract it again from the soil, still it would come in again in a different condition.

NEW SUBJECT.

Dr. Trimble said he had received a letter asking an answer from the Club in regard to an application for the curculio. He moved the subject be considered at the next meeting. Agreed to.

Adjourned.

April 15, 1861.

Mr. William S. Carpenter in the chair.

REMEDIES FOR THE CURCULIO.

Mr. Pardee presented a letter from Mrs. T. B. Hurlbut, in which she states that she has been for a long time trying to find a remedy for the ravages of the curculio among plum and other fruit trees. In her garden were a number of fine plum trees, which for several years were completely denuded of fruit from the attacks of this insect. At length, as no good could be done to the trees, it was resolved to cut them down, a purpose which was carried out. But there was one tree which stretched its arms over an apple tree, which had also been destroyed by the insect; this tree her daughter begged off, and it was therefore spared. That winter she made a composition of sulphur simmered in grease, which, when cold, was applied to the tree. The result was, that last summer her daughter came to her and joyfully informed her that the plum and apple tree were both bearing beautiful fruit. The best way of applying the preparation to the tree was by laying it on slips of canton flannel and tying it on to the tree. She was of opinion that this would prove a valuable remedy, and therefore brought it to the notice of the Club.

Dr. Trimble brought to the attention of the Club a recipe published in the "New York Observer," which was communicated to

that paper by a clergyman of Massachusetts, who had used it with considerable success in his own orchard. It was called the curculio remedy, and if all that was attributed to it be true, it was certainly the most wonderful remedy ever known.

Mr. Solon Robinson would like to know what the wash was.

Dr. Trimble read from the paper to show that it was composed of whale oil soap, sulphur, and some other ingredients. He also enquired whether any gentleman present had used the wash with success, as he should like to hear something more about it from those who had had experience of its use.

Mr. Pardee said he had not used it himself, but he knew many persons who had done so.

Dr. Trimble said he had made a number of experiments for the cure of this ravaging disease of fruit trees, and he had so far succeeded in his efforts that for one season he was nearly altogether free from curculio. He was determined to see what was the cause of this exemption, and he remembered that for a long time in the previous year there had been no rain, and the ground had been entirely dry. This was the true cause of the exemption that season, for the curculio would not pass through ground that was completely dry. He had found it to be a necessity to conquer the curculio or it would have conquered him. At present he did not believe in any single remedy. As far as his investigations went, coupled with the numerous experiments he had made, the only means of preventing the ravages of the curculio was by keeping the ground perfectly dry.

One of the members enquired what would be the effect if the trees were planted so that their branches might overhang the water.

Dr. Trimble said he had never tried that; but if such a mode was successful, the cause could only be found in the instinct of the insect which teaches her not to deposit her precious larva where there would be so much danger of its destruction.

Mr. A. P. Cumings said it was an old saying that one swallow does not make summer. Although a few applications of the remedies might not have been successful they might still be efficacious. From the information that had reached him from all quarters, it seemed that the wash was very effectual. He had received about twenty communications from gentlemen, all of

whom spoke highly of its virtues. A gentleman in Darien, Connecticut, had also applied it successfully.

The Chairman enquired whether it were true that the remedy was of no effect in case it rained.

Mr. A. P. Cumings explained that in the cases where the application had been successful there had been no rain. It however appeared to him that in case of rain the composition would have to be applied repeatedly.

Mr. Pardee enquired how many years the gentleman had used the remedy.

Mr. A. P. Cumings replied that he had used it for eight years, with success, except the first year when there was no manifestation of the insect at all.

Dr. Trimble thought this was a most important subject to the farmer, second only to that of manures. He had not only summered with the curculio; he had wintered with them also, and he could therefore speak with some knowledge.

SEED OF THE TREES FURNISHING PERUVIAN BARK.

Mr. Lawton said that a package of seed of the Chincona or Peruvian bark had been sent to this country by the United States Minister to Peru. They had been deposited with the American Institute and were now passed over to the club. If there were no persons better able to take care of them, he would move that they be given to Mr. Buchanan of this city, a member of the society, to be carefully tended and reared. The club was anxious about their safety, from their extreme rarity and the fact that their Minister in Peru had gone to considerable trouble in procuring them.

On motion of Mr. Pardee, it was resolved that the seeds be divided between Messrs. Buchanan and Bridgman.

THE POTATO DISEASE.

Mr. Lawton called attention to an article in the London "Mark Lane Express" on the pototo disease, showing that it had its origin in the operations of a minute fungus which propagates with astonishing rapidity. Experiments had consequently been made by planting the potato in double rows instead of single, on level ground and with considerable space between the rows. The earth was then embanked so as to cause the rain to run off the hills. A neighbor accidentally did the same thing by throwing

a board over a hill of potatoes which protected the tubers and saved them from the rot. The success of the experiment is explained in this way. The fungi are first deposited in the leaves of the plant and are washed down to the roots where they have full scope to destroy the plant.

Some unimportant discussion ensued on this queston.

THE TERRACULTOR.

Mr. McElrath (who was not present) forwarded some notes on a new sort of plough denominated as above. It was explained to be a rotatory digger, capable of being put in motion by steam or horse-power. It was the invention of Mr. Henry O'Reilly, and the first rotatory digger in the world.

Mr. Bergen thought it would be a long time before any instrument would be found to beat the old plough and horrow. When they succeeded in improving these, they would have something to boast of.

The Chairman made some general remarks on the improvements needed for the more effectual cultivation of the earth.

WHAT FLOWERS SHALL WE PLANT?

Mr. Pardee read a short article on this question. The Verbena should not be put out until early in May; the great variety of Phloxes would also do well in May. Pansies are apt to die out in summer without special care, To produce large plants, a change of soil is essential. Carnations and Pinks will be quite in time by the middle of May. A number of other plants were referred to in the same way.

RESTORING OLD APPLE TREES.

Mr. Pardee read a letter of enquiry as to the best mode of restoring old apple trees. He thought the best way would be to put the ground in good condition without injuring the roots of the trees, then mulch properly with stable manure. A little potash would be a useful thing.

The Chairman—If Mr. Pardee had added alum, he would have named a good remedy.

Mr. Pardee—Yes, alum and one pint of salt.

DISEASE OF LAMBS.

Mr. Robinson read a letter from a farmer in Illinois, asking what was the matter with the lambs, they were all dying, and if their disease continue, sheep-breeding would have to be given up

in Illinois. When first taken, they grow thin and run at the nose and eyes; they get very weak, and after laying down for twelve or fiftren days, die without a struggle.

A gentleman said that nothing of the kind had been experienced in Jersey. Their lambs, so far as he knew, were quite healthy.

POTATOES FOR PLANTING.

Mr. Solon Robinson wished to knew what kind of potatoes were best for early and late use. A member said the Prince Albert potato.

Mr. Gale said he had never succeeded better with any potato than with the Prince Albert. He had never known the Prince Albert to rot though he frequently had others rotting by their side. In reference to the potato rot, he had to say that the reason why so much loss had been suffered was because people did not plant full grown seed, nor did they dig their land sufficiently. The potato should not be planted in soil less than fifteen inches deep, and the disintegration should be perfect.

A lengthy discussion ensued involving the consideration of ploughs and manures, etc., the Chairman, Dr. Waterbury, Mr. Pardee and others, taking part in it.

One of the members said, that for an early potato, he had never found anything superior to an Early June.

LECTURE ON MANURES.

Professor Mapes proceeded to deliver his second lecture on Manures.

Twenty-five years ago, James Tallmadge, Thaddeus B. Wakeman, Charles Henry Hall, and four other gentlemen, called at my house; and, during the interview, said to me, "You have made some reputation in the application of chemistry as applied to the useful arts, but you are now advocating ideas that will ruin you, and we dare not place your name on the agricultural board, or renominate you as a vice-president of the Institute. We are confident that these theories which you advocate are erroneous, and deem it preper,.that as friends, we should make it our duty to speak to you thus candidly."

I must digress here to explain that the propostions, which these gentlemen considered so preposterous, were, first, that the atmosphere contained ammonia; second, that in the soil, the carbon, consequent upon organic decay in the soil, and the alumina, were capable of receiving and retaining ammonia for the use of

plants. All this as well as the possibility of the inorganic constituents of the soil being dissolved, was stoutly denied by my advisers. God alone could tell where the ashes of the plants came from, but they had seen plants grown in cotton, and in sand that was insoluble. Plowing to any such depth as twelve inches, they pronounced to be idle, and other notions of mine concerning subsoil plowing and under draining lands that were not wet, were simple nonsense. To sum up, if I did not withdraw these foolish propositions, I might consider my race about run among my friends at the Institute, who must regard me as little better than a lunatic.

Of course I was obliged to answer them, "Gentlemen, if I am mistaken, I shall have to fall by my mistakes."

I did so fall; and for many years my name was consequently left off fron the agricultural board, &c., of the Institute. However, I knew my opponents were honest in their views. Some years afterwards, when Liebig's book began to be talked about, Gen. Tallmadge read a few chapters from the first copy received, at a meeting of the Farmer's Club. "Why," said he "this is the same kind of nonsense that Mapes was talking to us five years ago."

Recently, Prof. Way and Prof. Johnson, of England, had a severe quarrel at the meeting of the Scientific Institute; one claiming that he had discovered. eighteen months before, that alumina had the power of retaining ammonia, and the other, claiming to have discovered it himself two years before.

I convinced myself that Liebig was, in his theories, right, if he referred to deeply cultivated soils, and that he was wrong, if he referred to soils as ordinarily cultivated; and I felt equally assured that the English chemists, who opposed Liebig, would be proved to be wrong whenever he had leisure to contradict them. After waiting eleven years, he, two years ago, published a pamphlet of 140 pages, in which his theory is proved so completely, that from that hour not one line has been written in successful contradiction of his statements, while volumes might be compiled from the writings of his converts, who had previously entertained directly opposite views. To Liebig is due the credit of the discovery, and in urging my own views, I do so, fully accepting him as the father of a theory, made plain and palpable by him, while I had merely recognized its truth, without furnishing the rationale which supported it. A gentleman who has published an agri-

cultural paper for many years, in referring to me on the subject of under draining, remarked: "This writer will, before long, advocate underdraining dry lands, and I do not know but he may advocate the under draining of a sand-hill. "I answered that article by stating that I was ready at once to advocate the under draining of the highest hill in America, to secure it against drouth, and to present conditions by which the soil should at all times be humid. Improved farming should not have "good seasons" and "bad seassons" in its vocabularly. Rest assured the farmer who experiences "good or bad luck," has not prepared his farm in the best manner of which it is capable, for if treated properly, it cannot offer uneven results, unless it be from insects, certainly not from drouth.

Now as to artificial manures. You are aware that I have been engaged in the manufacture of fertilizers; and, therefore, I have some delicacy in speaking on the subject. However, in taking a view of the leading artificial manures, I shall not be deterred from giving any fact that is fairly established, and calculated to be of universal benefit.

In the first place, bones have been known for many years to have very high value as manure. Their extensive use was commenced in England, where for many years they were used crushed, in pieces averaging perhaps an inch long, and were called inch bones. Four hundred bushels were allowed to the acre, and they produced increased crops. Then the half-inch bone was introduced, and became very popular. It was supposed that the early preparations of these bones had received some chemical additions, but this was not so. By using them in this finer form, the quantity required to the acre was reduced to two hundred and fifty bushels. Some one then proposed grinding them to a powder, and, this being done, the quantity required per acre was reduced to sixty bushels. Sixty bushels finely ground were found to be equal, in effect, to two hundred and fifty bushels of the half-inch size, and equal to four hundred bushels of the inch size. Then Liebig suggested, that if the phosphate of lime of the bone were rendered soluble, equal effects would be produced by ten bushels. This resulted in the treatment of bones by sulphuric acid. The next improvement was that, inasmuch as in some parts of the world, bones were much cheaper than in others, and inasmuch as the water and other evaporable material of the bone had less value per pound than the prosphate of lime, they heated the

bones red hot, before shipping them, and when the farmer bought fifty pounds of calcined bones, in England, he had the representative of one hundred pounds in the natural state, so far as the phosphate of lime was concerned. These calcined bones, treated with sulphuric acid, constituted the superphosphate of lime as originally used in England.

I commenced experiments with this superphosphate of lime on Long Island, at the head of Newtown creek, about the year 1830, and found that $100 worth of that preparation fully represented in effect, $500 worth of barnyard manure, at $2 a cord, which was the selling price for it in that locality. When I removed to New Jersey, I commenced manufacturing phosphate of lime for my own use. I was also experimenting on potash, and finally tried a combination, which produced a better result than that effected by either when used separately. Subsequently Peruvian guano was received in the country, and I tested that faithfully. I found that it contained, by its analysis, all the constituents of plants. I ascertained that Peruvian guano would start a crop, and sustain it up to a certain point extremely well, but would often fail before the crop was half perfected. Therefore I concluded that, though the guano contained the proper constituents of plants, it did not contain them in the requisite relative proportions to each other. Then, by experimenting with glass pots I found that I could raise sudden crops by it, but at the same time was putting the soil in such a condition that I would require more guano for a second application, to be able to repeat those crops; in other words, the soil became exhausted of its recuperative power. Then I commenced a protracted series of experiments, by dividing a piece of ground 200 feet square, into strips of 20 feet wide each, and applying to these strips severally, 20, 30, 40, 50, 60 pounds of guano. I then mixed the guano with fifty times its bulk of soil, using a sieve in doing it, so as to get it equally divided. Then I subdivided these twenty feet strips in the other direction, so that they were blocked, like the squares on a checker board, and, in these strips, I sowed each of the constituents of Peruvian guano, as ascertained by chemical analysis.

I put the whole 200 feet square down to oats, and when they were up, could readily detect a square better than all the others. By referring to my map, on which each operation was recorded, and calculculating the quantity of guano going in one direction,

and the particular constituents that crossed it in the opposite one, I could get at the precise mixture that that twenty feet square represented. Then I began with that mixture, instead of guano, on a new plot 200 feet square, and crossed it again with the constituents, as before, and again found that I had one, two, or three squares better than all the others; and, again calculating the mixture producing the best square, I tried again. I continued thus four years most faithfully, until, at last, I arrived at a mixture that produced results alike all over the squares. With that mixture I manured a piece of ground, which several members of this Institute examined, and which, though the mixture was put on thirteen years ago, retained its fertility for many years. The mixture was composed of 100 pounds of calcined bones, treated with 56 pounds of sulphuric acid, to which were added 36 pounds of Peruvian guano, and 20 pounds of the sulphate of ammonia.

This promised to be the proper mixture, and was what I then called the Improved Superphosphate of Lime. Friends, and others, who saw my crops, said, "As this mixture has such a good effect on your land, I would like to try some of it." I commenced its manufacture in a barn thirty feet square, the materials being rolled on the floor with a garden roller, to break up the parts, crush them, and mix them together. To-day the manufacture requires a row of buildings, with a front certainly as large as any New York block, with a 100 horse-power engine to move the machinery. But some of my market gardening friends, whose opinion I would rather have than that of farmers, as they manipulate their grounds more severely, and require larger results, said: "This manure acts well with us; we get larger crops from it than from stable manure, but it has a fault. If we get our tomatoes in market ten days earlier, we get two dollars a basket, while ten days later we get two shillings. Now if this mixture could only be made to be as early as our well decomposed barnyard manure, as we use it in extraordinary quantities, it would be a boon to us, because it costs us less than barnyard manure, and at the same time does not carry weed seeds to the soil."

While this had been going on, I had been experimenting on another matter in the same connection. A butcher, who lived opposite me, killed many cattle, and being able to obtain the blood in a fresh state, I found that one barrel of it mixed tho-

roughly with one cord of Jersey swamp muck, would throw the whole cord into fermentation. I tried it in all proportions, and it gave me a cord of manure that had all the value of a cord of well rotted stable manure. An analysis of the blood showed that it had all the inorganic constituents that the plant called for. I did not then know what I know now, that in the progressed condition of that blood, it has one hundred times the value of the same quantity taken from original sources. Then having experimentally proved the value of blood, I felt anxious to contrive some means by which it could be dried, as that would improve the process materially. The first machine I used was a series of revolving cylinders filled with steam, over which the blood passed, as printing ink over printer's rollers, until at the last one it was thoroughly dried, and could be scraped from the cylinders. This gave me a powder of blood, which I found occupied one-seventeenth of the bulk of the original blood, as it ran from the animal. Here was the equivalent of seventeen cords of manure reduced in bulk to one barrel, provided I had not injured its value by the drying process. I then applied sixteen barrels of water to one of dried blood, and, putting this with seventeen cords of dry muck, it fermented as before; this proved that the value of blood had not decreased.

The next step was to ascertain in what part of the world blood could be obtained sufficiently cheap to supply it in large quantities. There was a large killing establishment in Galveston, Texas, and a number of others in different places; I sent machinery there to dry blood, but soon found that the drying process was too expensive. The idea then occurred to me that I could cook the blood in fluids capable of receiving higher temperature than water, and press it into masses of convenient bulk.

By this process it was thrown out in cakes, dry and hard as a brickbat, and perfectly brittle, so that it could be ground to powder as easily as any other substance. Having thus obtained the means of procuring a large supply of dried blood, I commenced to experiment by mixing it with the Improved Superphosphate of Lime, to produce an early manure; because, by this blood, you can get vegetables earlier than in any other way.

This dried blood, like all organic matter when subjected to decomposition, will give off disagreeable odors, but by treating it with sulphuric acid, this objection was entirely obviated, and its value remained the same. The results of these experiments

convinced me that fifty pounds of Improved Superphosphate of Lime, mixed with fifty pounds of dried blood, formed 100 pounds of a fertilizer, equal to 185 pounds of the best Peruvian guano on earth, which could be sold at the price of $50 a ton, while Peruvian guano cost $45. As Peruvian guano has since been widely advertised and extensively used, it has increased in price, while that of the phosphate has remained unchanged.

When I went to my present residence in New Jersey, I commenced by hiring a small farm, with a right of purchase, and have succeeded, as many of you know, in increasing that farm until it is a large one, gained from the land itself, for I had not a dollar of capital. When I realized my own success, and saw what could be earned on a small farm, by under draining, sub-soil plowing, and the use of proper manure, I necessarily became a little fanatical, and therefore I may press these matters upon you to-day in too strong language, perhaps, but my convictions are balanced by my ledger. The clear profit of $6,000 last year, is the probable minimum for the future, beyond all my expenses, deducting the amount of taxes, rent, etc. In the March number of the *Working Farmer*, you will see the statement of last year. Now, under these circumstances, I may be deemed excusable in wishing my neighbors, some of whom do not make two per cent. on their farms, to adopt the same course.

I would urge, that notwithstanding the prejudice against what is called *book knowledge*, I would prefer a talented and industrious clerk, as a pupil to instruct in scientific agriculture, to an eld style, prejudiced farmer, filled with stupid dogmas, to be unlearned before he could be the recipient of ascertained truths.

An intelligent and energetic young man, whatever may have been his calling, surrounded by the necessary amount of incentives, such as the support of a family, may be placed on a farm after six months judicious reading and one season's observation of the operations of others, and if supplied with proper amount of capital for the purchase of proper tools and fertilizers, he will doubtless surpass the average of *book-hating* farmers. Indeed, if he is not wanting in observation and executive force, his success is far more certain than that of the farm laborer, who has only become expert in the use of tools, practicing only on precedent, and incapable of studying cause and effect.

There is no secret about it. My farm had been considered as

unworthy of cultivation when I went on it, and 34 bushels of oats was the product of a seven acre field. And now having under-drained, sub-soil plowed, and put on 600 weight of phosphate per year to the acre, I say, without fear of contradiction, that artificially adding ammonia, in any shape whatever, will be wholly unnecessary, as a full supply will be received from the sources indicated. You have given me a premium here for 100 bushels of shelled corn, and 400 bushels of potatoes to the acre. By the increased facilities afforded by improved implements, my laborers have been diminished from twenty to seven, (four boys and three men) who do the whole work on the farm, from 52 acres of which the profit is mainly derived.

In the earlier part of my practice I was employed to examine farms, and advise modes of treatment; the first thing I did in such cases was to carry a paper of bone dust, and scatter it in front of the cattle, and if they lapped it up, or if their young calves were toddling beside them for want of bone making material, I knew that that farm needed phosphate of lime. I have not found more than five per cent. of farms that were not in that condition, or where phosphate of lime or potash would not improve the soil, and have never discovered the amount to which you can use it without increased profit. I am constrained, however, not to use an amount beyond that which others would be tempted to adopt. When they ask, "How much phosphate do you use for that crop?" I tell them 600 pounds, but if the reply was 6000 pounds, they would say, "I am not going to spend that amount of money," although it is not as much as they would have to pay in using an equivalent in barn-yard manure—particularly in Massachusetts, where it would generally cost $5.00 a cord. I believe that a farmer should endeavor to invest his money in the increased fertilization of his farm, rather than by loaning it at 7 per cent.

In relation to the use of phosphate on dwarf pear trees—many of you have seen small trees on my place, bearing 200 pears, which had been fertilized solely with phosphate at an expence not exceeding five cents per tree annually.

It should always be mixed with several times its bulk of some divider, charcoal, muck or earth, and it would be well to mix it with more, if it were not for the labor. Apply it to the upper strata of the soil, for it is not volatile, and cannot be lost. Place

your phosphate in the ground in 1861, and in 1870, unless used in the interim by plants, it will be there waiting for you.

Adjourned.

April 22, 1861.

Prof. Nash in the chair.

RIVER DEPOSITS FOR MANURE.

Mr. Lawton said that, in a conversation with Mr. Thaddeus Davids, of New Rochelle, that gentleman had spoken to him in reference to the use of creek mud as a manure. Eight years ago, he had manured a part of a meadow with this mud, and a part with the best horse manure. The best part of his crop in the spring—the manure having been applied in the fall—was that manured by the creek mud. He has never applied any top dressing or any other manure to the place since; and the crops there are very fine. It is a heavy, loamy soil—the clay soil of Westchester county. Mr. Davids was delighted with the effect of the salt-water mud on his land, and thinks we have an inexhaustible supply of rich manure in our creeks.

Prof. Mapes.—It would be interesting to know whether there were any factories on that creek. The sediment of many creeks is of high value, while in others it has no value whatever, except, perhaps, in its use as mulch. The river mud in the marshes of New Jersey forms an admirable manure for potatoes. But a general recommendation of creek mud could hardly be sustained. Laid on land as mulch, the mud would give a later fall and earlier spring—keep the sun from having action on the soil when it is not required, and, being porous and loose, is always receiving gases from the atmosphere. But it could not be taken as a general recipe that creek mud was valuable.

Mr. Carpenter inquired if much did not depend on the kind of soil on which this creek mud was applied.

Prof. Mapes.—It is not beneficial to all soils alike, certainly. On soils deficient in organic matter, it was useful for mechanical purposes, such as he had stated. At deltas of rivers, or in marshes or creeks, the deposit is excellent manure, but it is not the mud, but the bark, leaves and other vegetable matter that has washed there, through all time, which made it valuable. Its value consists in the fact that it contains those things which go

to make up the mass of soils, and which are in it as a result of former organic decay. Wherever we find these deposits, they require to be put back more nearly to the position they possessed when they came there, to make them useful to plants. The deposit is in a state where you may view it like well made sour-krout, it has undergone a certain decomposition, and been arrested in a proximate position, and in that position it can never feed a certain class of plants. But disturb that position, by lime or ashes, and it is then ready to assimilate and go to form a part of plants. This treatment should always be given to pond mud and river deposits.

Mr. Lawton said the land he had mentioned, on which the mud was applied, was on a point open to the sea, and thus handy for receiving the manure; and, as the gentleman said he took it out in cakes, it is probable that he took up muscle beds.

Mr. Robinson said that even conceding that this swamp muck was the best manure in the world, how far could a man afford to cart it? He had his doubts whether it would be the most economical manure for a person who only had to pay for digging it up and carting it half a mile. The same money might be applied to greater advantage in the purchase of concentrated manures. He did not believe a farmer could afford to haul the best barnyard manure, if he got it for nothing, for two or three miles. He did not think it would bear hauling three miles. He believed in the doctrine of progressed fertilizers, and he believed that he could purchase them cheaper than he could haul stable manure three miles if he got it for nothing.

Mr. Trimble said the word "loamy" had been used here, and he would like to get at its true meaning. It was used in a good many senses.

Mr. Lawton said the soil of Westchester county had not been chemically analyzed, as he was aware of. The land he spoke of was inclined to the common low clay soil more than otherwise. It was rich and productive, when plowed and worked in the usual way.

Mr. Trimble said that in traveling in the West he had opportunity to see the fertility of land where this mud is deposited by the rivers. Between St. Louis and the Ohio river the grass in the prairies was actually as high as his head on horseback, and as rank as hemp. Every one knew the fertility of the Mississippi mud. He had no doubt that the application of mud to farms produced its effect, whether as mulch or manures. If he

remembered right Mr. Robinson had said at a previous meeting that his farm was poorer than even any spot in the State of New Jersey. In such a case, perhaps, progressed manures were the only kind that would do any good.

Mr. Carpenter said, in behalf of Mr. Robinson, that he visited the place of that gentleman that was so miserably poor when he first bought it, and he was delighted to see some of the finest crops he had seen in the State of New York. It had been done by the right application of manure, and showed what the soil of Westchester county was capable of doing when properly treated.

Mr. Fuller asked Mr. Robinson whether it was the manure or the plowing deep that so increased his crops.

Mr. Robinson said that he manured and plowed deep too, as he intended to keep doing. He had told his man that he could not waste time in plowing. The subsoil plow should follow in every furrow. He believed with progressed manures and deep plowing and draining he could make any farm in Westchester county productive.

Prof. Nash, the chairman, said he would try to answer the question, "What is a loamy soil?" There were three kinds of loam, sandy loam, loam, and clay loam. Soils are mostly made up of clay and sand. If a soil has 80 per cent of sand, 10 or 15 per cent of clay, and other ingredients to make up 100, it would be a loam—it might be considered a strong loam. But if it has 95 per cent of sand, only one per cent of clay, and other ingredients to make 100, it is a sandy loam. If it is 70 or 75 per cent of sand, and a large portion of clay so as to make it considerably tenacious, then it is a clay loam. We want an understanding of these terms throughout the whole country. People use these terms differently, and farmers in different sections of the country do not know what each other mean.

Dr. Waterbury spoke in reference to the question, how far it would pay to haul stable manure. Liebig advanced the idea that if you supply the earth with inorganic matter the ammonia necessary would come from the air. The agricultural world is divided as to the necessity of ammonia in manure. He believed that ammonia was necessary to the roots of plants. In the interior of this State, where ashes exist to a great extent, and the people are engaged in the manufacture of potash, these are used very generally for restoring land; but apply ashes alone and they cannot raise a crop. Some stable manure is necessary.

Mr. Fuller said the low bottom lands of the West were fertile without any ammonia.

Prof. Mapes said that in Monmouth county where the land is white sand, positively valueless, good crops are raised by the simple application of potash.

Mr. Carpenter called the attention of the club to some seedling potatoes he had received from Mr. C. E. Goodrich, of Utica and Mr. Buckley, of Massachusetts. He read a paper from Mr. Goodrich describing the different kinds sent, and giving the best mode of treatment of potatoes.

PROF. MAPES' THIRD LECTURE ON MANURES.

Prof. Mapes delivered his third lecture on manures, viz: Progressed fertilizers. It was received with applause, and Prof. Mapes was invited, by vote, to continue his lectures, until the subject was exhausted.

Professor Mapes said that in his previous lectures he had endeavored to establish a few facts in reference to the best system of manuring—a matter of the utmost importance to the practical farmer. First, that every element is progressive, through its assimilation in organic life, taking new functions in each advanced stage of its development, and thus fulfilling more perfectly the design it is intended to accomplish. Take, as an instance, the potash in the debris of feldspar rock. It would be assimilated by the lichens and other low classed plants which cling to the rock, and in process of time by their decay, return the potash in a form capable of being taken up and appropriated by plants of a higher order. Thus it would be found to possess functions for assimilation which it did not possess in its primitive condition. The same was true of every primary element of every organism thus far analyzed. And there were, besides, innumerable instances, familiar to every farmer, which he could bring up in turn, proving it to be true of every primary that goes to form the composition of plants.

2d. That the use of ammoniacal and other gases received from the atmosphere, was mainly to give new properties to water, making it a more general solvent of inorganic material. The chemical changes produced under its more active influence, were consequently more rapid and more beneficial to plants. Thus it would be seen that there were two conditions of soil regulated by these differences of organic gases. In a deeply disintegrated soil there would be conditions discovered very different from

those apparent in a soil that had only been surface plowed, being sometimes too wet and sometimes too dry. The speaker believed that a soi properly drained and sub-soiled had never been known to suffer from drouth; and this was explained simply on the ground that the atmosphere, if freely admitted into the soil, could always supply moisture, and furnish the necessary amount of ammonia and carbonic acid, to render the water of the soil more capable of dissolving the inorganic compounds required to sustain the plants; not only supplying the progressed elements, but assisting in the operation.

The life principle of plants was also a most important agent in the general law of progression. Thus, as stated in a former lecture, a tumblerful of water containing soil, might be made to exemplify the process, if it contained the fertilizing gases. The presence of a root in this tumbler, will cause the water to dissolve a much greater portion of inorganic matter than would be taken up by a like quantity of water, in which there was no root.

But before entering upon the subject on which he had intended to speak, he would draw attention to an experiment which had been made by the Rev. Mr. Smith, of Lois Weedon. This gentleman found that if he planted alternate strips of wheat, so that spaces amounting in all to one-half an acre should be completely covered, the half acre so occupied would produce more wheat than would the whole acre planted in the ordinary manner. He therefore planted alternate rows of wheat (leaving the intervening strips bare), and using half the quantity of seed which he would have previously required to plant an acre; the intervening spaces being thoroughly disintegrated. To his surprise he found that though he had applied no manure of any kind, he had a much larger crop than if he had sown in the usual way. The next year he repeated the experiment, and continued to do so for fourteen years, merely alternating the relative position of the wheat and bare strips, and his crop went on gradually increasing to 36, and finally 48 bushels. He, however, does not recommend that the wheat should be planted without manure, but believes that if his field had been manured the yield would have been greater still. By permitting the roots of the plant to pass through those parts of the ground where nothing was planted, and where the atmosphere was permitted to permeate, thus giving full power to the active principle to be freely developed; and by changing the relative position of the rows from year to year, he made way for the disintegration of a quantity of new inorganic

matter. He (Professor Mapes) knew many cotton planters who, instead of planting their seed in narrow beds, make a similar alternation in their cotton rows.

Concerning the value of farm-yard manure and the best way of taking care of it, the lecturer said, that although some persons had been opposed to his views on the question of manuring, and had concluded that he was opposed to barn-yard manures altogether, he would say, that the use of barn-yard manure should be doubled and quadrupled everywhere. The great difficulty and mistake with farmers was, that they did not cart nor use one-half as much as could be used with profit and advantage to themselves. This should be the question. If one hundred loads of manure cost $100 and produce $500, why not employ five times the amount of manure, that the profits might increase in a corresponding ratio? There were many farmers who could produce eight thousand cabbages on an acre; he did not speak of early cabbages, but of fall or late ones. This is done, and done easily, too; and a decided advantage is derived, in addition, from the great number of leaves, which by mulching benefit the soil. Then suppose the farmer obtains eight thousand cabbages; two thousand prime will be worth six cents each; four thousand second class, four cents each; and the rest would sell, upon an average, for two cents. But suppose more stable manure were used—as in the case of some gardners who, for every load they brought to market returned with a load of manure—the crop of cabbages would be so much improved that the number of prime ones would be much increased, and there would be scarcely any thirds at all. In such a case it was not right to use the smallest, but the greatest quantity of manures; because not only were better crops secured by using plenty of manure, but the farmer was certain to get his money back with fair profit. But some would ask, "Can we, who are so far from great cities, be able to get this manure, so as to manipulate and make available as large a quantity as appears to be necessary for profitable cultivation?" It does not follow that because farmers are near to cities, that therefore they need necessarily be the greatest consumers of this fertilizing agent. In many parts of Massachusetts stable manure is sold at five dollars a cord, and in New York it only brings one dollar; and yet, if the price were reduced to two cents, the New York farmers would not touch it, beyond their usual quantity.

Mr. Robinson inquired what was the practice in Jersey?

Professor Mapes said that the Jersey gardners made it a rule to appropriate all the manure that could be obtained. He contended that the value of stable manure consisted in the amount of inorganic matter which it contained. The organic matter was useful to any soil not properly plowed. But to thoroughly disintegrated and subsoiled land, the atmosphere would supply all the ammonia that it could require. When the farmer has to contend with a bad soil, he naturally becomes more dependent on manures for his excitants. He would refer, in elucidation, to experiments made by himself. He once added, to a thoroughly cultivated field on his own farm, sulphate of ammonia in crystals and in other forms, but it did not affect the crops one iota. But in his neighbor's field, where the land was not subsoiled, the organic matter was of very great use. Then the effects of rain are carefully to be noted. The first half pint of a shower, on a warm day in summer, is full of gases, and in percolating through the soil these are retained.

In soils that are heavy and clayey, it was frequently necessary to plow in straw or long manures, to admit a free circulation of the air, an operation supplying mechanical advantages that cannot be over-lauded. Certain farmers are pleased, in manuring, to have their fields reduced to a kind of saponaceous consistency, while others are satisfied with merely throwing their manure on the surface of the soil, and report that they have found as much benefit from this practice as if the manure had been buried in the soil. But we are very liable to mistake one action for another. If a plank be placed upon the grass, it will be found that after the obstacle is removed the grass will grow taller, fresher, and be in every respect more flourishing than that in any other part of the ground. If carpenters' shavings be placed over the grass, the effect is the same. This is in effect what is called mulching, a practice that farmers frequently resort to even for grass field. The principal use of top-dressing is its action as a mulch, preventing the water which falls on the soil from freezing, and allowing it to percolate freely to the roots of the plants. Where the land is mulched, there is generally an earlier spring and a later winter. Therefore the mistake is in considering the action of the mulch as that of the manure, and attributing to the manure on the surface the effects which it produces mainly as a mulch.

It is an established fact that manures should contain some

divider. Old charcoal braise or cinders, form one of the most excellent dividers that can be found. If we go into the country, wherever we find these charcoal braise we also find early, fresh and luxuriant grass, because the charcoal has the faculty of absorbing and preserving all the gases which are so essential to fertility. He remembered once passing through the country and seeing a very fertile field, of which the people said that if they took away a few cart loads of the soil, it would be sufficient to enrich any barren land. He was so struck with the extraordinary richness of the field, that he at once determined to find the owner, and to ascertain his *modus operandi* in fertilizing it. After some difficulty he found the man, who informed him that the ground was formerly covered with large trees, but that his father had cut down the wood and turned it into charcoal, which he sold in the city. The whole of the land was then disposed of, with the exception of that field, which was subsequently sold to Col. Calvert, as the owner could at the time do nothing with it, in consequence of the immense amount of charcoal braise upon its surface. He (the Professor) examined the soil, which he found strongly impregnated with charcoal, and also with the ammonia which it had for a long time been receiving in immense doses from the atmosphere. A comparison with adjacent fields showed that this land was much more fertile than they. Farmers should therefore be very careful to make use of charcoal; for not only was it a good divider and an absorbent of gases, but the amount of potash it contained was of the greatest value. Pond scrapings and the washings of rivers were also excellent assistants in the fertilization of fields. All kinds of decomposed matter should of course be brought into use by the practical farmer.

The Professor here explained most minutely a system of economy in the preparation and application of manures. The explanations were made by means of some chalk drawings on the blackboard, representing a shed and gutters. The solid manure was to be carried into this shed and placed in alternate layers with the muck; and to every barrow of the solid manure add sixteen barrows of muck; over this mass were thrown frequently the fluid drainage of the heap, pumped from the receptacle in which it was collected. By this process of economy, as explained by the Professor, the farmer adopting it would in the spring have sixteen times more manure than the man who followed the open

barnyard practice. As fast as the fluid ran over into the gutters, and was received into the receptacle prepared for it, it was again pumped on the original heap. As long as the mass was kept in fermentation, there could be no failure in the results, for the decomposition would always be rapid and complete. There would never be any necessity for turning over the mass. If the slightest escape of ammonia became apparent, the addition of a single quart of sulphuric acid would change the ammonia to sulphate of ammonia, which was not volatile, and would be found equally soluble and valuable in its effects. But the muck, although of so much value in this way, is of no value at all when not treated in this manner, and differs as much in its properties as a raw hide from a tanned one. If the muck be treated with a lime and salt mixture, it is carried back to the principle in which it originally existed. The fluid manure may also, with good results, be used in the fields, and the farmer may convert every manure into a fluid or solution. In fact, by means of pipes and gutters, and a plentiful supply of water, not only can solid manures be converted into fluid, by continued fermentation and filtration, but they may in this manner be carried to the most distant part of a farm. This plan was well known in Flanders, and there was no reason why it should not be as successfully adopted in this country, where our natural and artificial advantages were so abundantly superior. If any example were needed he would refer to the case of Mr. Mechi, in England, who had carried out this system at immense expense. But the cost need not be great in this country. Mr. Mechi had to construct expensive machinery, and besides had to contend with numerous difficulties which cannot be met with here.

If the land should at any time require any farther excitants, lime will be found an excellent application. Few soils contain as much lime, properly conditioned, as plants will appropriate; lime may be used with effect, not only as a direct food for plants, but to prepare the pabulum for their support. Again, as one of its secondary effects, it neutralizes acidities. In case the land should be over-limed, as has sometimes occurred, it can be immediately rectified by a sprinkling of common salt. If it is over-salted it recovers its equilibrium by a single application of lime. But lime should never be buried beneath the soil. A stratum of lime placed on the top of a barrel of sand, will, by the assistance of moisture, speedily find its way to the bottom.

Lime can settle down through soil by the mere action of water. In Jersey it had been frequently known to settle through a subsoil. Should this difficulty occur, it may be readily arrested by deep plowing, which will bring the lime to the surface.

At the next meeting Prof. Mapes purposed treating of potash, and its influence in agricultural operations.

Adjourned.

April 29, 1861.

Mr. Gale in the chair.

WATER-WHEEL.

Mr. Jonas Smith exhibited and explained a new water-wheel, submerged, and with a central discharge. It is so constructed that a small sheet of water is applied in as good a form as a large sheet, and is applied at the circumference of the wheel, adapting this water-wheel to a very small supply of water. It may be furnished for $50 or even less, and will furnish a convenient power for churning, washing, turning grindstones, threshing, &c. Wheels of more than nine inches in diameter, will cost more.

SOD SEEDER AND BROAD-CAST SOWING MACHINE.

Mr. John B. Duane, exhibited and explained a model of a new agricultural implement, costing about the same as a mowing machine, which cultivates, sows, covers, rolls, and sows plaster or other manure, at one operation. [For description of the machine and its operation, see report of Polytechnic Association, of April 25, and of May 1st.]

SLAUGHTER HOUSE AND OTHER MANURES.

Mr. Bruce read a letter from North Blackstone, Mass., inquiring what is the best way to use slaughter house manure.

Mr. Carpenter.—It should be mixed with earth, so that it be not too much exposed to the atmosphere.

Prof. Nash we waste as many millions worth of that manure as we buy of guano; and it can be saved and applied to the soil for less than half the money which we pay for guano. In the country the farmers should join together and make a contract with the butcher to preserve it it for them, as it cannot be applied from week to week. The offensive effluvia can be prevented by mixing it with large quantities of peat, dried swamp

mud, as dry as may be. Or if this cannot be obtained, the same object may be attained by the application of charcoal dust, light soil from under the hedgeways, mixed with decomposed leaves or soil from the borders of the forest. The compost should be forked over two or three times, until it becomes uniform throughout. With this manure, a poor farm can very soon be made fertile.

Mr. Carpenter.—The slops from the kitchen also are very valuable, especially for the vegetable garden.

The Chairman mentioned the results produced by using these systematically, by one of his neighbors, who had built a cistern to receive everything from the house, together with a portion of the rain from the roof. This produced a liquid manure which was pumped up and applied to the land, resulting in large crops, and costing nothing beyond the original outlay.

Prof. Nash.—If applied in the form of a weak solution, differing little in appearance from rain-water, the resources of any family would enrich the farm, and obviate the necessity of buying manure. But for every shovelful of manure there would be a barrel or hogshead of water, and consequently the weight and expense of removal would be so great as to be impracticable, excepting upon a large scale, where appliances may be brought to bear to move that weight with ease and cheapness. Mechi estimates that two mills will carry a ton of manure to any part of his farm. With such means, this process could be carried out with great advantage.

Mr. Lawton.—I wish to make a few remarks upon the connection between animal and vegetable life. There is a life, death, and resurrection of plants, and it produces a life, death, and resurrection of animals, for vegetable and animal life are each dependent upon the other. There is no corruption in nature; what is sown in corruption, rises in beautiful incorruption. When every object fills its proper position, it is not only true to nature but is adapted to beautify and ornament the earth. Some manures may be very good in themselves, but not good enough to pay for carrying long distances. It becomes the more important to save the manures which are to be found everywhere. It is from the little that the big arises; and the smallest possible portions of that which is too often wasted, will, by their fertilizing properties, contribute to improve the soil. Grass lands are benefited for many years by an application of plaster of Paris, because it requires from five to seven hundred times its weight

of water to dissolve it, and thus little by little, it is taken up, year after year, by the rain and the dew. The machinery necessary to carry out the system of Mechi, is not available to farmers generally. In most cases it is better, instead of having even a cistern, to have the barnyard upon the slope of a hill, hollowed in the centre so that it shall only overflow in the heaviest rains. A few shovelfuls of plaster of Paris, or of charcoal, will prevent the escape of ammonia, and, if the soil is not too sandy, the manure will penetrate the earth but a few inches.

Dr. Trimble.—All vats and cisterns for the accumulation of filth about an establishment, are radically wrong. If the slops from the kitchen are good, they should be put upon the garden at once, instead of putting them into a cistern where they will be offensive to the family and to the neighbors. Manures should be taken out in the spring and should not be allowed to accumulate, and then there will be no place for flies to breed to annoy your family. A cistern for the accumulation of these things, is liable to become not only offensive but dangerous. There is no disease so unmanageable as that sometimes produced by the malaria from cisterns. The best management of the accumulations is to permit no accumulations; put them upon the grape vines at once.

The Chairman said that no sweeter place could be found in New Jersey than around the premises of the neighbor to whom he had referred. A cistern properly managed, will not become offensive, and will be the source of a large amount of valuable manure annually.

Prof. Nash.—If the premises are cleared as soon as the spring opens and are kept clear until the winter freezes in, that is the best way; but that is something the farming community will not do.

Mr. Robinson.—Westchester county land is full of animal substance, living earth-worms. How can they be converted into manure?

Mr. Lawton read an extract showing that in Great Britain the use of marl is generally restricted by agreement in leases of farming land.

Dr. Trimble said that in the chalk neighborhoods, they call chalk *marl*—in other sections, clay is called marl. The New Jersey marl is an entirely different substance. By the greensand marl, Monmouth county has been raised up from one of the

poorest soils to one of the best, and other counties are following in the same track from the same cause.

Mr. Carpenter.—More depends after all upon the cultivation of the soil than upon the application of manure. Land upon which a sufficient quantity of barnyard manure has been applied, sometimes fails to produce, and then the subsoil plow will make it fertile again. Underdraining is expensive, but it will pay in the end, and frequently the first or second crop will pay the whole expense. Less manure will produce better results upon land underdrained and subsoiled.

The Chairman.—The only question about underdraining is whether the farmer can sustain the expense of the outlay. Every man who has underdrained a single acre of his land, will admit that the first two years will pay the expense, and will go on to drain more of his land.

Mr. Lawton.—Underdraining is a cheap method of manuring, for the soil being aerated every day, derives from the atmosphere and from the dew, a large amount of ammonia. Ground that is thoroughly drained, derives from the atmosphere all the moisture it requires, and will never suffer from drought.

Prof. Nash.—The Loisweedon theory is that land properly underdrained and subsoiled, will bear good crops forever without manuring. A field has been planted with wheat every year for twenty years, the crop increasing from year to year, although not a particle of manure was applied. The land was divided into strips three feet wide, and the alternate strips were planted with wheat in drills, the crop being as great as if the whole had been sown in the usual way. The next year the strips were reversed, planting those which the first year had remained fallow, and so on. But while this would indicate that it is foolish to expend our money for manures brought half way round the globe, it does not render it less proper that we should use to the best advantage what manures we have, for the earth is the great absorbent of whatever would render the atmosphere unwholesome.

PROF. MAPES' FOURTH LECTURE ON MANURES.

Prof. Mapes.—I propose to-day to consider a few of the special manures.

LIME.

Many farmers are under the impression that the chief value of lime is in its action as a manure, while in fact the amount directly

used by the plants is shown by analysis to be small. The difference in quality in lime is very great, so much so that for plant food a single bushel of one kind of lime may be worth more than several bushels of other kinds. When the secondary uses of lime are called for, the difference is not so great. Lime decomposes organic matter in the soil, and also changes the mechanical texture of soils, and for this purpose the kind of lime is of little importance. The plains of Athens, as I have before remarked, contain forty per cent of carbonate of lime, and many chalk farms of England are said to contain a still larger percentage. In our own limestone districts, the amount of lime in the soil is much greater than that required by vegetation. It is in the condition of limestone, but if it be heated red hot, and thus converted into caustic lime, a season's exposure will restore the carbonic acid, and it will again become carbonate of lime in another condition; it will be more active, because it will be more completely divided, chemically and mechanically. Yet in Westchester county, if you add 2,000 bushels of its lime to the acre, which would be about two per cent of the weight of the soil to the depth of twelve inches, it would render it barren.

Shell lime is superior in its effects, where lime is needed as direct food for plants. Burned oyster shells give us a lime which may be profitably applied, even in our limestone districts, at the rate of ten, twenty, fifty, or even one hundred bushels to the acre. We find, too, that that part of the oyster shell which we usually call the valve, or the eye, contains a trace of phosphorus, which gives it a greater value. In making the lime and salt mixture, which is done by decomposing one bushel of salt by three bushels of lime, the salt being placed in solution, and the mixture forming the chloride of lime and carbonate of soda, we find that it is more active and more valuable as a manure, if made of shell lime, than if made of stone lime.

When we add too much lime to the soil, its mechanical texture becomes unfriendly to cultivation, as in some portions of Hunterdon county, N. J., where they have added lime to the soil until it cracks. The remedy for over-limed land is to topdress with salt. The dews and rains carry down its saturated solution into the earth, until it disappears. It changes the lime into the chloride of lime, and forms carbonate of soda, and the land is restored. I have seen many cases of the restoration of over-limed land in this way. Lime is the remedy for soils where salt has been used

too heavily. Many persons, for the purpose of removing parasitic plants, or getting thistles out of the land, salt so heavily as to stop all vegetation. It may be done fearlessly; for although large applications of salt will render the land sterile for one year, it may be brought into cultivation the next season by a slight topdressing of lime. Some of the marls of New Jersey, containing large amounts of copperas, are treated empirically with lime, sometimes to so great an extent that salt is required to counteract its effects.

The proper quantity of salt to be applied depends materially upon the condition of the soil; in coming in contact with the various alkalies in the soil, the muriatic acid of the salt is taken up and the soda set free, which takes up carbonic acid from the atmosphere and becomes carbonate of soda. I have found five bushels to the acre to be entirely sufficient. The lime and salt mixture may be used even recklessly, because any excess appears quite inert. I have used it extensively to correct the injurious effect of hog-pen manure when applied to the brassica tribe.

Mr. Fuller.—How much salt is required to destroy vegetation?

Prof. Mapes.—Sometimes twenty-five bushels to the acre, and sometimes one hundred. I have put at the rate of one hundred and fifty bushels upon asparagus beds, to kill the weeds, and would occasionally find one to escape. Asparagus is not injured by salt; it will grow up through half an inch of it. One hundred bushels to the acre may be thrown upon a bed intended for strawberries, and the next year the land will be found uninjured.

I should recommend, as a precautionary measure, before again using the land, to throw a little caustic shell lime over the surface, to find its way down by the dews and rains.

The form of the ultimate particles of lime, in the division consequent upon slaking, is quite peculiar; and it will pass down through the soil with great rapidity. Thus, if you place upon the top of a barrel of soil a dressing of lime, after making a hole in the bottom of the barrel, and pass a stream of water through it, in a single month you will find the lime upon the lower head of the barrel. A heavy dressing of lime at long intervals of time is wrong, because lime will pass down through the soil and arrange itself upon the sub-soil. In under-draining my present farm, I found in some places a white streak upon the surface of the sub-soil, rendering it, from its admixture with the sub-soil, quite impervious to water or atmosphere passing down

or up. When we increase the depth of plowing, we turn up large quantities of lime and bring it to the upper soil. It is therefore best to add lime in small doses and frequently. I never apply more than five bushels of lime to the acre, as a dressing, and then only when the land is in bare fallow. It should never be plowed, or harrowed, or cultivated in. Left upon the surface it gradually sinks, coming in contact with every particle of the soil.

The effect of lime is to hasten the decay of all fibre and organic matter in the soil, which is not in a living state, to cause it to pass into the condition known as eremecausis. It seizes upon a portion of its silex and converts it into a soluble silicate of lime, capable of coating a corn stalk, giving strength to the blade of grass, or of preventing oats from lodging. It must at the same time free all the other inorganic matter from the surface of that grain of sand, or silex. The lime causes every particle of organic matter to give up a portion of its constituents in such a condition, that they may be more readily appropriated in organic growth. This is equally true of potash and other alkalies.

We find, for instance, in making common mortar that to insure a good result it is desirable to use as little lime as possible, provided there be enough to form an absolute coating upon every particle of sand. Many years ago, Mr. John B. Dodd tried some experiments at the Mechanic's Institute in making mortar. He took half of the mortar, and passed it many times through crushing rollers. He then took six bricks and put them together with mortar as ordinarily made, and six others and put them together with the mortar so manipulated. They were laid by in charge of a committee for two or three weeks, and were then brought out. In attempting to lift the pile constructed with the ordinary mortar, the upper brick was separated from the rest. The other pile had been provided with means upon the upper and lower brick for suspending it by a scale beam; and it was loaded to the extent of 1,400 pounds before it came apart, and it then broke through one of the bricks and not through the mortar. At the same meeting Mr. Dodd remarked that he had seen in an old copy of Vitruvius, a representation of two boys beating mortar with wooden cleavers.

Mr. Williamson said that when he was a boy his business was to beat mortar for his father, who was a mason. He always made his mortar the year before and put it into pits; and when

he dug it up for use, it was again thoroughly beaten. In the same way the glazier will take old and apparently dry putty, and work it until it becomes perfectly miscible, and glaze a frame with it, and it will become much harder than putty freshly made.

Mr. Upjohn stated that in building Trinity Church the mortar was thrown through a pair of rollers several times before it was carried up to be used; and when applied the weight of the stone would squeeze it out so that the mason could take the excess away, leaving an exceedingly narrow seam which became very hard. The process is that a silicate of lime is formed, and being received upon the surface of moistened stone or brick, enters into every little capillary pore, and there dries, forming millions of dovetails, which prevent the material from readily coming apart.

We all know that the presence of lime in the soil creates such chemical changes as will induce the formation of nitre. During the wars of France, Napoleon had the mortar dug out from between the stones in the cellars of Paris, and replaced it with new mortar, using the old for leaching out the nitre for the manufacture of gunpowder. The presence of nitric acid in water increases the solvent power of the water. Some soils become charged with acetic acid, which causes an undue rapidity of decomposition of organic matter, but this can be corrected by minute doses of lime; the quantity required for the purpose never amounts to even five bushels to the acre.

The effect of lime upon boggy or peaty land we all know. One of its effects is to neutralize that minute quantity of tannic acid which always exists in boggy land. Our Newark meadows are a deposit from the delta-like action of the rivers, to which are added the washings from the high lands, bringing down decomposed leaves, etc.; and there is tannic acid enough to prevent the growth of almost everything but strawberries and asparagus and potatoes. Lime will remove this acid, and it is otherwise a good soil.

Dr. Trimble.—How much lime would you apply to the soil, and how often?

Prof. Mapes.—It will depend upon the soil, and upon the crops raised. I should think five bushels every three years to be sufficient. I am convinced that farmers use too large quantities. Put on thirty bushels to the acre, and in ten years a large proportion of it will be lying upon the surface of the subsoil.

Mr. Carpenter.—A gentleman states that he salted his land at the rate of six bushels to the acre, for a carrot crop, and it entirely destroyed his carrots. He then put it into ruta bagas without additional salt, and it entirely destroyed them. Is he right in his supposition that it was the salt which destroyed them?

Prof. Mapes.—He is not.

Mr. Fuller.—I have tried six times that quantity for grapes. I have tried salt to kill weeds in paths, and it killed them for about three weeks, but afterward, in the same season, everything seemed to grow the better for it.

Mr. Bergen.—Can spots overflowed by the sea be restored so as to be used the same season?

Prof. Mapes.—A slight top-dressing of lime will do it. As to applying salt, where lime exists in the soil, the amount required will bear no ratio to the amount required for a soil destitute of lime. Mr. Fuller's land probably had lime in it.

Mr. Fuller.—I have no doubt it had.

Prof. Mapes.—If there was enough lime, 60 bushels or 600 bushels might not check vegetation for a single month. In my garden paths, where there is little or no lime, the weeds are eradicated by salt, and for less money than would be required by any other method.

LIQUID MANURES.

Prof. Mapes.—When the manure heap is arranged as described in my last lecture, with a cistern at the lower end, supplied with a pump, so that the drainage of the heap, the wash from the house and stables, and a sufficient quantity of rain water, may pass into the cistern, and by a windmill or other means, may be continually thrown back upon the heap until the whole becomes homogeneous in its character, there will be nothing lost, and the decomposition will be twenty times as rapid as under other circumstances. If this fluid can be distributed over your fields by sprinkling carts, or can be carried economically by leaders to shower different parts of your farm, it will be found to be indisputably the best mode of applying manure. But these conditions do not often exist. A great many meadows, by the use of town sewerage, have yielded five tons of grass where previously they produced but one; and the rental has been raised from 2s. 6d. to 40 shillings sterling. Yet the town sewerage is not so

good as the Flemish solution, or the solution from the aggregate heap of the farm. It is well to bear in mind that by this method all the manure becomes soluble, and never need be taken out in a solid state, but may thus be used in its greatest state of division, in the form in which it can be soonest transformed into crops.

It is sometimes said that certain substances are "very lasting manures." I wish one could be found that was not, so that all that it was capable of yielding could be used in the current crop. The true explanation is, that parts of manures are used up, and other parts are valueless without the presence of the portion parted with. If we could carry that part back to market and get our money for it, and save the interest, it would certainly be preferable. Suppose that a farmer puts inch bones on his land, at the rate of 10,000 bush. to the acre, he could only get a certain amount of effect, which would not differ materially between 10,000 and 1,000 bushels. On the other hand, suppose that he put on two bushels of bones, rendered soluble by sulphuric acid, the effect will be greater than that caused by any quantity of coarse bones, although costing so much less. Manuring with a lasting manure is putting your money out at compound interest, and paying the interest yourself, which is bad financiering. You cannot apply any amount of inch bones which will produce as much effect for the current year as the interest of their cost would pay for, if the money were applied in putting on soluble phosphates. The same rule applies to all manures. That is the best which is in the best condition for the use of plants. And when you get a fluid manure made in the way I have named, to which you have added all that is required to assist its action, potash for the unyielding bones and organic matter, soluble alkalies, that can be diffused throughout to assist in the decomposition, or if there should happen to be an excess of potash, a little sulphuric acid to prevent the escape of the volatile gases, you have all that your manure is capable of giving, in such a state that it can be availed of by the plant between that night and the next morning, to the extent that it may meet with their roots; and if you choose, it can be availed of in the current twenty-four hours next ensuing.

Judge French told us, in this room, of what he saw at Mr. Mechi's, who, when he cut off a grain crop to feed his cattle, immediately showered the land with liquid manure from his leader,

and in this way succeeded in greatly increasing his results during the season. Mr. Mechi has been talked about as every man will be, who attempts to do things in a radically different way from others; but I have read his balance sheets, and looked over his accounts carefully for a number of years. He has been a great benefactor to his country. Although, if he had to pay the rates that we pay for labor here, he would make no money, still he would save himself, and that would be a great deal better than many of his neighbors do upon similar farms.

The Chinese understand all these matters, for there they waste nothing of the manurial kind. We can get some hints concerning the results of irrigation, from the inundation of the Nile. It is stated that the amount of matter carried into the Atlantic ocean, from the Gulf of Mexico, in a day, is equal to the available soil of a county. The Gulf stream is rendered turbid by it. There is a headland below New Orleans, that within my memory, Capt. Bradish and Johnson, two Balise pilots, have sailed over. And they have been rendered immensely wealthy by the deposit of those splendid estates known as the Woodland estates. They use no fertilizing material; but every thing they raise is of a superior quality. If you examine their soil, you will find that it is composed of the inorganic matter that has passed down the tributaries of the Mississippi, the lime from every tree that has decayed, the potash, and all the inorganic matter resulting from the decay of organisms. Treat the soil with dilute acetic acid, boil it for twenty minutes, and you will get eighteen times as much inorganic matter required for vegetation, as in the best garden soils. It is the result of the trituration and decay of vegetation. This is what is swept into the ocean; but it is not lost. It is taken up by fish, shell-fish, and birds, whose dung forms guano, and brings it back to us in a still more progressed condition for human use. If it were not so, the surface of the globe would have long since become barren.

Mr. Carpenter—Why does land sometimes become barren from repeated applications of barnyard manure?

Prof. Mapes—I have known soils to get into a state incapable of carrying on chemical action, in which the process of "ferment" is absent; gardeners who, commencing with the use of 200 lbs. of guano to the acre, now use 1200 lbs.; not that they require all that as food for plants, but because the property of ferment in guano is small. Barnyard manure becomes much more valuable

when night soil is added, the chief value of which consists in the peculiar ferment it gives to the soil. Sometimes in the use of barnyard manure, there will be either sulphuretted hydrogen or carbonic acid generated, and the soil will become deadened. Such land requires lime or potash, for the purpose of decomposing the fiber that is not in a state of ferment.

Dr. Trimble.—Do you think nothing is lost in the ocean?

Prof. Mapes.—I think there is not. This world is a very old place. I doubt very much whether the Chinese, claiming 14,000 years for their own history, include within a one-millionth part of the age of this globe. And if any of the fertile portion of the earth were permanently lost, there would be a time when the earth would become sterile. I do not think Providence ever makes mistakes in His laws.

Among fluid manures, night-soil is of very great value, and human urine particularly; but it should never be applied undiluted or in its fresh state. The changes it undergoes are very great, and it should have time for them. These changes are greatly assisted by the presence of sulphuric acid. When made very dilute, it is the cheapest and best manure you can have; and the solid portions of night-soil are the next so. A poudrette properly made from night-soil is the best manure manufactured. I am very willing to sell phosphates, of course; but whenever you can obtain night-soil at $1.50 per load of thirty bushels, do not buy phosphates. Where you wish to put the manure, place charcoal dust, muck and salt and lime mixture, or earth from the woods, on each side, and drive the night-soil cart across this strip, throwing the night-soil in the middle, and then covering it over, and there will be no odor after it is once covered. At the end of a month it may be mixed, by using an old-style potato digger, and no offensive odor will escape from it. Such a manure is more valuable at that cost, than any other you can get. Poudrette made in that way is a very different article from what you buy, where you have to pay for cooperage, clerk-hire, freight, and the expenses of the company that make it; and you have plenty of the material at home, for you can make poudrette with head-lands, and make it extremely well. When you have so treated night-soil, you will be perfectly surprised to find, if you add it to the compost heap, how much will be rendered soluble, and what immense amounts of water can be charged with it and spread upon your land.

It must be remembered that no manure acts at all until it is positively in solution. A plant cannot take it up and bite it as we would a cracker, and it is, therefore, important to reduce what you have into that soluble state as speedily as practicable.

ASHES.

It is very common to hear farmers say that leached ashes are nearly as good as unleached. That is only true when the land is already fully supplied with potash; for twenty cents worth of potash upon land that needs it, produces a marked effect the first time it is used. Leached ashes have no value, as now treated by the best operators, other than for the phosphates not taken out by the soap-makers; potash is taken out almost perfectly. But unleached ashes have many times the value usually attributed to them. I have paid twenty cents per bushel for the ashes from a spoke factory in Newark, where the chips used in running the engine all happen to be of the best kinds of hard wood. And I would pay seventy cents per bushel, to have these ashes delivered at my farm, rather than be without them. They are worth it to any farmer in the land. I have yet to find the first piece of soil that would not be benefited by the application of such ashes, the phosphates and the potash of unleached ashes.

All the constituents of these ashes are ready for use. They have been in organic life. They have formed part of a tree. They have been in a state of liquefaction, and have been selected by the roots from the soil, and are returned in exactly the state to be re-appropriated.

With the leached ashes, you must remember that a large quantity of other material is added to them. In some Western asheries the leaching is sometimes badly performed, and there will be potash remaining just in proportion, as they do not understand their business, but when leaching is properly done, the potash is taken out; the other inorganic constitutents are not of so valuable a kind, and particularly the silicious portion.

Mr. Carpenter.—Are ashes good for all soils? I have heard that they are good for light soils, and not for clay.

Prof. Mapes.—That is only true in degree. On sandy soils, incapable of holding ammoniacal products of decomposition, ashes assist in that office. But clay soils already have that power; and if that were the only office of ashes, the saying would be true. But it is not always so. My soil is a heavy clay, and the effect of potash can be readily seen upon it. There

never was a clay soil which was not acted favorably upon by its application. You do not have so sudden an action as in sandy soils; but there is an effect and it can be seen in every crop.

The paring and burning of land, I have seen fail, and where it contains iron, the harm it does from the change of its form is greater than the benefit of burning. But when there is no excess of iron in the soil, then using the paring plow and burning the surface, and afterwards sub-soil plowing and using the burned paring as manure, may renovate the soil and produce good results.

The value of ashes from burning the surface of bogs or swamps is less, for the reason that the plants there produced are lower organisms, and, therefore, the inorganic matter left after the burning, although it had been once in solution, and was sufficiently progressed to enter into organic life, yet belonged to lichens and mosses, lower forms in the scale of progression. Some bogs would perhaps produce an ash worth ten cents per bushel; while others would yield a far inferior kind.

PLASTER OF PARIS.

I would direct your attention here particularly to the difference in the value of plaster obtained from different sources. Take native plaster, grind and apply it, and the reason why it acts as well as it does, is that so little plaster is called for by certain crops. But take plaster that has been burned, such as is used in the plastering of buildings, and one bushel will take the place of twenty bushels of rough rock. Plaster that is made by treating bones with sulphuric acid, where the lime of the bones is converted into the sulphate of lime, or plaster, has a high value to any farmer to the extent that his crops call for plaster. It is taken up with very great ease. The French have found that taking plaster which has been exposed to atmospheric influences, such as that taken from ceilings made from Plaster of Paris, and grinding it fine enough, one bushel will have much more effect in preparing for clover than plaster not so exposed would have. The native Plaster of Paris is found underlying the city of Paris. When you treat any organic matter containing lime with sulphuric acid, the sulphate of lime, then formed, has an immense value. It is more valuable than the phosphate in that condition. We find that some chemists in making analysis of manures, consider the sulphate of lime as valueless, because it happens to

bear the same name as an article from Nova Scotia; but the analogy between the two substances is no greater than between a horse chestnut and a chestnut horse.

SALT.

From the time of William III. to George III., in England, common salt bore so high a reputation among the farmers that nobody thought of farming without it, though we hear but little of it. They passed laws which still exist that no turnpike in England should be permitted to charge toll upon salt carried as manure. At one time they paid as high as a guinea and a half for salt for agricultural purposes. I paid at first four cents per bushel for refuse salt, and probably applied the first bushel ever used as a fertilizer in my neighborhood. The value of salt is very great. But keep it away from cherry trees, as it will change the flavor of the cherries the first year, and the next year the fruit will fail. Salt should be applied as a top-dressing. The dew will carry it down as a saturated solution, strong enough to destroy many insects and a very large class of weeds, while it will pass over every particle of the soil. Beside the value of salt as a manure, it has great hygrometric power; and it will travel by capillary attraction for some distance. I have top-dressed a strip of land with salt, which had been dressed with lime, and the next year have seen many head of cattle standing in a row over that place, not on account of the salt, but for the better feed which grew there.

Charcoal is erroneously supposed by many to be a manure. It is not soluble, and plants cannot feed upon it. But it has very peculiar powers in the soil, both chemical and mechanical. Mechanically it holds the soil open and accessible to gases. It darkens the soil, thus enabling it to benefit more from the sun's heat. The only reason that garden soil becomes so dark is that an immense amount of organic matter is left there in the form of carbon, as the result of decay. A single shovelful of manure will do more duty where the soil is black, than a bushel in the field near it. Earth from the woods contains much carbon, and gardeners and those having green-houses which are well supplied with woods earth will pay high prices for stable manure, because of its power to be continually active. Carbon and alumina are the two elements in the soil that have prevented all that now forms the verdure upon the earth's surface from passing to the

earth's centre, leaving the surface barren. Were it not for carbon and alumina, our wells would all become cesspools. Through sea sand, with one per cent of finely divided charcoal, the brown liquor of the barnyard may be so filtered as to become colorless and inodorous. Damp charcoal will take up from forty to sixty times its volume of gases of various kinds. Place under a bell-glass a saucer of charcoal and another of volatile carbonate of ammonia, and when the saucer of ammonia becomes entirely empty, the charcoal will be found to have taken it all up. You cannot smell it, nor wash it out of the charcoal. But place the root of a living plant in that charcoal and render it humid, and then you will perceive that the plant has the power of taking it out.

Mr. Carpenter inquired whether bone-black, applied eight years ago, could now begin to affect the soil.

Prof. Mapes.—Yes; but not the bone-black *per se.* Bone-black has no earthly value in its natural state; but if one atom of lime be taken away, rendering it a super-phosphate, it will then begin to act. Josiah Stickney, twenty years ago, applied 400 tons of bone black to his land, and after fifteen years he began to see a little effect. Now, when he applies extremely dilute sulphuric acid, it forms a phosphate, and he obtains large results. Any manure applied to a piece of land containing bone-black should be moistened with dilute sulphuric acid, which will render the bone-black active. By dilute, I mean truly dilute; one part acid and a thousand parts water.

On the mountains where they formerly made charcoal, all around the old charcoal hearths will be found spots where the cattle get the first bite of grass in the spring. I contracted with the New Jersey railroad company for a number of years to give me a couple of loads or more of charcoal cinders per week. When applying phosphates to the soil, I use them as a divider, and then sow them in with the phosphates. Charcoal should be kept in the manure shed all the time. It should underlie the bedding of the horses, be thrown in the urine troughs, and thus prevent wastage.

Dr. Trimble.—If a farmer keeps stock enough to furnish all the stable manure required by the land, does he require any other manure?

Prof. Mapes.—No, sir; but he would find it better to apply something else, because in some particulars his soil would dete-

riorate. But there is not one farmer in ten thousand who can keep stock enough. The question should not be with the farmer how little manure will raise a crop, but how much manure can be applied with increased profit? This may be the more important in raising vegetables for the market than in raising hay or corn. A gentleman in Rhode Island has actually applied 800 pounds of phosphates with a very good result, having raised 62½ per cent more onions than usual, besides a crop of carrots upon the same ground.

GREEN CROPS.

There is a prevailing error of opinion concerning the manner in which green crops act as a fertilizer. It is well known to you that I do not believe in adding ammonia artificially to a well prepared soil; although I do conceive it to be needful to a badly prepared one, where the water requires that its solvent powers should be increased. I do not believe that the plant is capable of obtaining its nitrogen from any such salts; but ammonia increases the solvent power of the moisture of the soil, and the plant obtains its nitrogen from the atmosphere. The action of the roots of growing plants gives to water an increased power of dissolving and receiving the inorganic matter of the soil, and in doing so, of changing the conditions of that inorganic matter so as to render it capable of feeding a class higher than its own, giving it a function it did not before possess. We all know that lichens and mosses will grow upon felspar rock, and take from it a supply of potash. Yet that same rock, however finely ground, would not yield up to wheat an ounce of potash to the acre. Notwithstanding the fact that felspar is the original source of potash for plants, it cannot be assimilated by the higher classes of vegetation. Therefore we find that lower plants have the power of taking up that potash from the felspar rocks and the debris of those rocks; and having been once assimilated to them, the higher plants receive it from their decay and re-assimilate it.

We may add nitrogenous material to soils, and even barn-yard manures, well fermented, until the soil gets at last into such a state that without alkaline assistance it refuses to yield good crops.

Clover, when grown upon a soil thoroughly under-drained and subsoil plowed, is capable of percolating that soil down through the disturbed subsoil. It is capable of performing that function

of the root I have described to you here, the function of giving to water the power to dissolve inorganic matter in the soil. If, as already exemplified in a former lecture, a quantity of common soil, with water, carbonic acid and ammonia, be placed in two vessels of water, and in one of them be also introduced the root of a growing plant, the portion of inorganic matter dissolved in the latter vessel, will be found to be twenty-five times greater than that dissolved in the vessel without the root.

It is for this reason that a green fallow is so important to the soil. The growing crop gives the humidity, the moisture covering every substance in its vicinity, the power of being a better solvent of inorganic matter, and it is thus storing up in an advanced state the inorganic constituents of the soil as food for the next crop; and particularly when that crop is itself suffered to decay in the soil, as in plowing under a clover. We find that the sulphate of lime has the power to retain the gaseous products of decomposition, beyond the power of water to waste them away; the power to absorb and retain them against all conditions other than the presence of a root of a growing plant. When the soil is deficient in these constituents, clover is caused to grow in it, and send down its roots, ramifying, as we know to a great depth, performing the functions I have described through large areas. Thus it lifts through subsoil, and up to the surface of the soil, large quantities of progressed inorganic pabulum, which may be readily appropriated by the ensuing crop. If that clover be plowed under, we have the conditions consequent upon the addition to the soil of all the progressed material that crop has gathered. In addition to this, the decay of the clover in the soil secures many mechanical advantages. It occupies space. From the gradual decay of this matter, there is necessarily a slight motion; the particles occupying less space as they change their condition. Thus, they freely admit atmosphere and moisture, giving to the soil that peculiar property described by Hayes and others as "ferment." No manure has material value that will not give this to the soil. All these advantages arise from the sowing of clover.

This is not the only green crop we may use. In some districts we grow buckwheat for that purpose, and the process may be repeated twice in the same season, and in some districts oftener. Field peas, in some soils, form an admirable grain crop, because the vines decay first in the centre of the straw, when buried

under the surface, thus forming a million tubes ærating the soil, and supplying conditions of fertility.

Prof. Nash.—Will you state your views as to the comparative benefit of plowing in or feeding off clover.

Prof. Mapes.—There are two questions which arise from the feeding off the clover, one is, that so much of the clover as will go to make up parts of the new organism of the animal is, of course, robbed from the soil, but so much of the clover as, after being appropriated by the animal, forms a portion of his excretions, is increased in value, enough so perhaps to compensate for the whole or a part of the missing portions. They are returned in a progressed condition, for we should bear in mind that it is not the constituents that have value, but the condition of those constituents; for instance, chemically considered, the constituents of a man do not differ at all from the same constituents found in the rocks, yet you would find it very difficult to combine rocks in such a way that they would plant potatoes or deliver a lecture on manures. The constituents are the same in a tree as in the lowest organisms of nature, hence it follows that merely knowing the constituents of a manure does not always enable us to determine its true character. Tho analysis of a manure, unless it can point out the condition of every constituent in it, will give you no clue to its value. The gentleman (Dr. Thompson) spoke to you this morning of the phosphates contained in the ashes he used. Now we have phosphates in the Hurdstown rock, but they are not worth, to the agriculturist, 6¼ cents per ton, and we have phosphates in bones, which have a high value. The phosphates in ashes, having been in organic life a million times, are ready to enter organic life again, and a pound of them is worth more than a pound of sombrero guano, or any other volcanic product which is phosphatic in its composition. One might as well talk of the arsenic in a pane of glass, when the object is to kill a rat, because the analysis of glass shows that it contains arsenic, as to talk of phosphates, for fertilizing purposes, unless they are in the proper condition to be appropriated by plants. The gentleman also remarked that he wished he could sell you the ashes of straw; it was evident that he believed the ashes of straw to have a much greater value than the ashes of wood; not that they contain more potash, but because that which they do contain is in a higher condition, better capable of feeding the higher classes of plants than the same quantity of other potash. Do not forget that of most constituents, in all soils, the quantity

is hundreds of times greater than the requirements of the crops, but that the condition of the materials is not such as to yield them up to the crops. I believe there is not a soil in the whole Mohawk or Genesee valley which does not contain, even of the phosphates, sufficient for over 700 crops, and I never saw a soil that did not contain, quantitatively, enough lime for thousands of crops, but I have found many a one requiring additions of lime, because that which was there was not in a condition to be appropriated by plants, therefore you must remember that the great value of green crops is that they consist largely of those constituents required for crops, in the required condition for assimilation. Take the analysis of starch, which goes to form fat; of gluten, which goes to form muscle, and you cannot find a chemist who, by making up the same composition, can produce either fat or muscle. You know that if you want these you must use them in their proximate condition, and not in their ultimate or primary condition. It is to these facts that green crops owe their value.

Again, green crops act, in a degree, as a mulch. They not only add these elements by their decay, for even if you cut off the clover, you remove a much less proportion of the organic matter than would be supposed. You have only to cut up a portion of the soil, four feet deep, en masse, and place it upon a sieve and let a stream of water pass through it, to become convinced of the great value of the roots of the clover left in the soil. Of the action of clover as a mulch, I shall speak again in a separate connection. Every gardener knows that if he will properly fertilize the soil and place his cabbages near enough together for their lower leaves to cover and mulch the ground, he will get a better crop than if the cabbages were placed at a slightly greater distance apart, notwithstanding the fact that upon soil not fully prepared, the same number of cabbages will require a greater number of square feet. Upon lands containing an adequate quantity of progressed material, larger and better cabbages can be raised by letting the lower leaves lie down and assume the figure which nature intended for the plant, so that it acts as a mulch to the soil below.

Prof. Nash.—If it be true that the improved condition of that part of the clover which goes to form animal organization is enough to set off all the loss by its being fed to animals, does it not follow that it is wisest for the farmer to feed off his clover instead of plowing it?

Prof. Mapes.—In most districts there cannot be a doubt that the practice of feeding the clover and substituting cheaper manures, is profitable. Any one whose farm borders upon the deltas of rivers, with deposits like the meadows opposite New York, on the Long Island and Jersey shore, can get organic matter cheaper than by taking that part of his clover crop which grows above the ground, as manure. Let the clover leaves be used as fodder, and while the roots are retained, let them prepare also other organic matter, remembering that the value of organic matter is not in any supposed nitrogenous compound present, but in the advanced condition of the inorganic matter contained.

MULCHING.

It is most important that mulching should be clearly understood. Place a board upon the surface of the ground late in the fall and leave it until spring, and you will find that the grass will grow there much taller during the following summer than where the ground has not been so covered. This, in England, is known as Gurneyism. Mr. Gurney, the discoverer of the process, supposed that grasses so covered did not require manure, as increased crops could be obtained simply by this covering of the soil. It is true that covering the surface of the soil for the time with shavings, stable manure, planks, or anything else, prevents the freezing of the immediate surface, which would cause the soil to cease to be permeable so early in the winter. It permits water to descend which would otherwise not do so. It prevents the too severe action of the wind, coming at about the same season, from drying the immediate surface, so that the plants are sustained to a later date. Mulched grounds or soil, can be kept open to a later date, and the gases arising from the decay of vegetation, have longer opportunities to enter such a soil than a soil not mulched. I have seen men spread long manure upon a field and let it lie for weeks exposed before plowing it under; and they tell us that it has just as good an effect as if they had plowed it under early, forgetting, that while they were losing a portion of their manure, which should have been retained, they were using the long matter connected with it as a mulch. I prefer to plow my manure in, when I use any, and use the coarse salt grasses as a mulch upon the surface, taking it off with a horserake at the end of the season and using it for bedding afterwards. In this way all the advantages of Gurneyism are

secured without the disadvantage of the waste in dressing with long manure.

FISH.

A number of other organic substances have been maltreated of late for the purpose of making fertilizers. Some chemists propose to treat fish with sulphuric acid, and to make the compost dry by drying out the water. A few years ago, a Mr. Rotch came here from Europe, and proposed treating butchers' offals in the same way, forgetting that they contain 90 per cent. of water; a sirloin piece of beef contains 87 per cent. of water. Butchers' offals, dead horses, &c., treated with sulphuric acid and made into a dry powder, the chemist stated, would contain all the organic constituents in a proper state to nourish vegetation. When animal matter is treated with sulphuric acid, it is not in a proper state to feed plants. It is only true of the phosphates contained in that animal matter; of them it is specially true. Barren Island was made a depot for this manure, and thousands of tons were there manufactured. At Brighton, near Boston, Nourse, Mason, and others, put up works costing $40,000 to $50,000, and took butchers' offals and made this peculiar kind of material. They called it here the Cheval guano, being made chiefly from dead horses. After being experimented with, it was found to be a failure, and the company becoming insolvent, several thousand tons of it were sold at auction. It brought some $3 a ton, and at that was found practically to be a poor manure. So it is with fish when thus treated.

Fish decompose very readily when buried, as all the necessary absorbents to take up the result of their decomposition exist in the soil, viz: the carbon and the alumina, without which, as I stated in my last lecture, every well would become a cesspool, and the fluids passing down from the surface would carry the food of plants beyond their reach, leaving the whole surface of the earth barren. Fish may be applied in the soil, throwing it into the furrows, as practiced upon Long Island; and then require only the presence of potash, or lime, or some other alkali to assist the decomposition. Although the soils do not require alkalies, it is well then to add them for that special purpose, and not to supply any deficiency in the soil.

WOOLEN WASTE.

Thousands of tons are wasted in this city alone, and much in many other parts of the country. Farmers in England use

woolen waste for cold soils to render them warm enough to produce plants which are raised upon other soils analogous in their condition. They warm the soil almost like a preparation from the hotbed. Then we find also that wool contains phosphates and sulphur, or perhaps more accurately phosphorus and sulphur, and especially that substance known as the yolk of wool; and they are so readily soluble that if sheep be improperly washed before shearing, the weight of the wool may be reduced 30 per cent. This phosphorus is so much progressed that it is of high value as a fertilizing material. So with the sulphur; for in its decomposition it does not form sulphuretted hydrogen, but readily and immediately passes into sulphuric acid and forms surphates, and that, too, of a character very superior to the crude sulphuric acid which is seemingly the same. Thus when you treat phosphate of lime with sulphuric acid, you change one atom of the lime into the sulphate of lime; but it is not such sulphate of lime as we get from Nova Scotia. It is not plaster of paris, worth $4 a ton. It is worth 11 cents a pound to any farmer, and is of greater value per pound than bone phosphates. Its functions are changed entirely. It bears no relation to the mineral, as to solubility, for it is extremely soluble. And so it is with every constituent of woolen rags. They are all exactly in the condition to be readily appropriated by plants, and are consequently of a much higher value than is usually attributed to them. In composts they ensure a rapid decomposition, and, strange to say, without the usual fire-fanging that we find in rapidly decomposed composts. They form, with any potash they meet with in the soil, a peculiar soap. The soap made from the yolk of wool is such as we see prepared by Lowe of London, and called the "army shaving soap." The action is very different from the mere action of crude fat upon potash or lime. The stearite of lime will do no such duty. Those who hold to the nitrogenous theory must be aware that the albumen of the wool, upon decomposition, gives them very largely the thing they call for. Chevreaux states that 100 parts of thoroughly dried wool contain 26.06 parts of inorganic substance; and adding to this the 32 parts of fatty matter, you perceive that 59 parts of the whole weight of the wool are exactly what the agriculturists call for.

I will now suspend my remarks, and devote the remaining time to answering questions.

SPENT HOPS.

So long as the brewers use hops in the way they now use them they form, when properly treated, a good manure. The whole soluble portion of the hop is resident in the *farina fecundi*. If you will beat a bale of hops so as to separate the pollen entirely, you can take the whole bale of leaves and they will not render a quart of water bitter. A tin can full of the pollen of the hops will have the same value as the bale, and the leaves need not be present in the beer to soak up any part of it. But the inorganic matter of the hop is principally resident in its leaf, and consequently it must have high value as manure, provided you can obtain it near enough not to have to cart the large bulk which it claims from its configuration. There are certain peculiar proximate acids in the hop, after the brewer has done with it, which require correction. This may be done with any alkali, and a very little of it. It then forms an admirable manure. So in England the malt dust is very largely used.

LEATHER PARINGS

require to be first treated so as to decompose the tannic acid. Three bushels of caustic shell lime with one bushel of salt, so mixed as to change the whole of the lime into a chloride of lime, and the whole of the salt into a carbonate of soda, will make four bushels with which the leather chips may be covered and kept moist until their condition is changed, and the tannic acid decomposed. They may then be mixed with large amounts of inert matter, such as swamp muck, etc., and will make a compost valuable from the inorganic matter given up by the leather, which of course is present in the condition you want it.

HAIR AND FEATHERS

give you so much albumen and so little of other materials that I never found them useful excepting for celery; but for celery they are the best manure you can get. I have found with them the most astonishing results, and in many instances have noted that both ends of the hairs would have hold of the celery root and be looped.

Mr. Robinson.—They are good on grass.

Prof. Mapes.—So are leghorn bonnets, or anything that will cover the surface and still permit the air and light to permeate it.

BARLEY SPROUTS.

The refuse from the brewery you are sure to find valuable; it cannot be otherwise; they are the same constituents that in nature's progression made the barley, and particularly that part of the barley most ready for reappropriation—the germ—and they must be highly valuable as manure.

Dr. Thompson.—Why does the soil under the board, that you spoke of, differ from that by the side of the board?

Prof. Mapes.—Simply because a larger amount of fertilizing gases, and the carbonic acid of the atmosphere, pass through that under the board than through the other. It is kept in a state of humidity, so that the carbonic acid can travel rapidly through it. Carbonic acid will travel readily through moistened surfaces, so that by placing a wooden board over the earth, the earth then acts as a syphon. The board is not tight enough to exclude the atmosphere, but keeps the soil moist, and free from the battering of the rain which in excess often causes the alumina to form an impervious coating.

IRRIGATION.

You are all aware that chemical action takes place best when the material to be absorbed by the plant is in the most diluted state. There is very little water that does not contain inorganic matter in solution, consequently in irrigation you present the inorganic matter in exactly the state to be most readily absorbed. Not only that, but you set in motion such inorganic matter as is in the soil ready for appropriation, but not brought into mechanical contact with the roots. Therefore the same water that has yielded up to one root its material recharges itself in passing to another, and again yields up its inorganic matter; and thus it goes on, carrying food to a large number of roots. In addition to this, as the water passes down through the soil, the air must follow it; and that which has been there gives place to air containing new quantities of fertilizing gases.

TAN

when the bark becomes old enough to be readily disintegrated, I have seen very good results from decomposing it with the lime and salt mixture. And so with a large amount of factory waste.

BURNING.

Whenever you apply fire you get up conditions that vitrify some of the elements, or render them less soluble and less sub-

ject to decomposition; so that they cannot be so readily appropriated.

Mr. Pardee inquired what was the best manure for rose bushes, which require the richest possible manure to be used in a city garden, where the expense is no object.

Prof. Mapes.—Place in one corner of the garden a barrel, to be filled with stable manure, and pass water through it, and assist its action by adding potash, if you please.

Mr. Pardee.—That is unsightly.

Prof. Mapes.—As you are well aware, I consider the best thing to be the nitrogenized superphosphate of lime. Dissolve it if you like; inasmuch as mingling it with the soil might lead to an unequal distribution, giving too much at one time and too little at another.

CUTTINGS.

I do not base it upon the maxim, "similis similibus curantur," but I suppose that a rose might thrive better with a supply of particles upon the same level of progession with itself. Of grapes I can speak experimentally. I have a vineyard of 1,200 grape vines, and I am compelled to trim them severely. I then run the cuttings through a cutting box, such as I cut hay with, and divide them into pieces one quarter of an inch long. I mix these with the green sand separated from the Squankum marl, which is the most rapid decomposer that I know of. I apply this to my grapevines with admirable results. I get finer wood and finer fruit with that kind of manure than with any other.

On motion of Mr. Pardee, the thanks of the club were presented to Prof. Mapes, for his very instructive and interesting course of lectures.

The subject selected for the next meeting is "Indian corn and potatoes." Adjourned.

PROCEEDINGS

OF THE

POLYTECHNIC ASSOCIATION.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
June 14, 1860.

Professor Mason in the chair.

Mr. S. H. Elliott produced one of Winship's patent self-ventilating refrigerators, and stated that the principle on which it was constructed was very simple, being in fact, as old as the laws of nature; that the ice was placed in the top, and the provisions in a chamber appropriated for that purpose, at the bottom; the register, in front of the ice department, was for the ingress of air, which, on feeling the effects of the ice, fell into the provision chamber underneath, thence, up an apartment along the sides, making its exit through the registers in the sides; that the pressure of the atmosphere on the refrigerator was so great, that it prevented the vapor from rising to the top; the principal advantage of this refrigerator over others was, that the cold air performed the double function of effectually cooling and ventilating the provision chamber, and protected it from the warm air without; that the provision chamber being furnished with an atmosphere that was uniformly cool, and constantly changing, articles of a strong odor could be kept in it, without, in any way, affecting those which are more delicate; that there was combined in this refrigerator a saving of space, food, and consumption of ice, &c.; it took medals wherever presented; the one produced was No. 3, cost $25—prices vary from $15 $40.

Mr. Dibben.—What would be the difference of letting the air pass through the bottom, instead of the sides?

Mr. Elliott.—By doing so, the ventilation would not be so perfect. This box will contain a piece of ice, weight forty

pounds, for four days. I have kept a piece of ice weighing sixty pounds for the space of a week in one of them.

Chairman.—What do you claim to be the peculiarity of this refrigerator?

Mr. Elliott.—We claim a more perfect ventilation by that descent,—by letting the air pass through the sides we check the passage of the cold air, by letting it out at the bottom the cold air passes off too rapidly.

Chairman.—Will you state what the superiority of this re-refrigerator is over those made by other manufacturers—Schooley's for instance?

Mr. Elliott.—The superiority of this one is, that it retains a larger amount of cold air than Schooley's does; also, that the ice placed at the top; whereas, in Schooley's patent, the ice is placed at the bottom, and the air escapes through the top. The atmosphere, although heated, did not deposit any moisture on its ascent for the purpose of passing through the registers in the sides. Strawberries and other fruits could be kept for a week without changing their flavor.

REPORT OF COMMITTEES ON NEER'S DYNAMOMETER.

Mr. Dibben, from the committee appointed to examine Neer's Dynanometer and Register, made the following report:

That in the opinion of the committee, this instrument being made of proper size, will correctly measure and register the actual power taken from any revolving shaft, or which may be applied to move any revolving machinery. It is not complicated, and when well made, will not be liable to get out of order.

As many good descriptions of the instrument have been written, your committee refrain from enlarging on this subject.

June 6, 1860.

EDWARD W. SERRELL,
FRANK DIBBEN,
R. P. STEVENS.

BITUMEN.

Dr. Stevens—Bitumen, petroleum, rock oil, Seneca oil, asphaltum, and mineral pitch, are all synonymous and varieties of the same substance found in nature, being certain definite compounds of carbon and hydrogen. It is invaluable as a coating for wood and metals, having a rich, glossy lustre and durability. Hardware

manufacturers of Great Britain and the United States, use it for the purpose of preserving their iron ware from the corroding power of oxygen. Pipe layers also use it to prevent the rapid oxygenation of iron. Bitumen is found in the following geological positions, viz:

1. In the black slates of the Taconic system, changed into anthracite.

2. In the calciferous sandstone as an anthracite.

3. In the Black river limestone at Montreal, in cavities of the rocks.

4. In the Hudson river group of rocks, as bituminous shale.

5. In the Niagara limestone at Chicago oozing from the rock, giving the white limestone the appearance of having been used in the walls of Babylon.

6. In the Marcellus shales of Onondaga county, where it is mistaken for coal.

7. In all the groups of rock that extend upwards to the sub-carboniferous.

8. In the subconiferous, as petroleum, as Seneca oil in New York, and Venango county, Pennsylvania, two hundred gallons a day.

9. In the same form in the coal measures at Kanawha, Virginia, and other streams in Ohio and Pennsylvania, also as bituminous coal and slate.

10. In the red sandstone of Virginia, and North Carolina as coal. In the latter State, as bituminous blackband oil.

11. In the cretaceous strata of Long Island, New Jersey, New Mexico, and Utah, as coal or lignite.

12. In the Tertiary, as lignite in California, and as a dyke, jutting into the sea, encased in Tertiary rocks.

13. In volcanic rocks—from both extinct and living volcanoes.

14. In the sands of Trinidad, as a bubbling lake in the middle, but hardened on the edges.

Mr. Seeley presented a specimen of paper of Japanese manufacture, for the inspection of the members present.

DENTISTRY.

Robert L. Pell being called upon, remarked as follows:

Teeth are the hardest structures belonging to humanity; without them man would be unable to articulate a single syllable, and expression to the face would be lost; they are formed by

the union of earthy matters with gelatine. All our bones possess the power of recuperating themselves if they are broken, but teeth do not; once fractured they never grow again. Bones after death, moulder away and soon return to earth; teeth appear to resist decomposition and defy chemicals, as their tissue is compact and hard. They are covered with enamel, which is semi transparent, white, glossy, and of crystalline structure, composed of

Animal matter and water	1
Phosphate of lime	85.3
Carbonate of lime	8
Fluate of lime	3.2
Phosphate of magnesia	1.5
Soda and muriate of soda	1
	100

Teeth have blood vessels, nerves, and absorbents, so minute that microscopists have failed to trace them, but physiology has proved that they exist.

Teething is the most critical period of a child's life, as has been proved by the fact that half the deaths of children under two years, are caused by diseases induced by teething. At which period the child becomes irritated and feverish, and requires that the mother, or nurse, should be very particular in their diet, for whatever affects the nurse slightly, affects the child intensely. I have lost calves before now, that were poisoned by something the mother had eaten, which did not affect her in the least. Our newspapers teem with accounts of children who die by teething, when in fact death is superinduced by exciting and stimulating food eaten by the nurse at this critical period in the child's life. In the West Indies, among the blacks, who live chiefly on a vegetable diet, death rarely occurs in childhood, and the children cut their teeth without pain. This would certainly be the case here, if mothers were less desirous of gratifying their artificial desires for stimulating food. The milk from the breast is the only food, medicine, or drink, which will be desired during the first few months of infantile life, nor should they, on any account, have anything else until they cut their teeth. The process of teething would then no longer, as now, be the source of disease and death. To dentition in children the following diseases are refer-

red: eruptions of the skin, diarrhœa, croup, convulsions, water on the brain, ophthalmia, &c.

A great sympathy exists between the head and teeth. The ophthalmic nerve extends to the eye. The superior maxillary communicates between the nerves of the eye, ear, and face, and the great sympathetic nerve. The inferior maxillary is connected with the under jaw, and runs deep, it is sub-divided and forms two nerves, one passes to the tongue, and forms the sense of taste, and the other to the lips and chin.

Teeth are liable to diseases, some of which are hereditary. If you find children with decayed teeth, you will discover that their parents had them likewise. Some teeth are largely composed of soft bone, which is porous and decays readily, external injuries, tartar, calcareous particles, &c., produce inflammation and induce decay, which is readily imparted from one to another, until they make an elegant gentleman appear disgusting and slovenly. A woman may have the eye of a gazelle, the cheek of a rose, the form of a Venus, and if her teeth are defective, they will all be lost upon man.

The whole number of teeth in a well developed mouth is thirty-two, sixteen above and sixteen below. They consist of four classes: Cuspids, bicuspids, incisors and molares.

The permanent teeth appear about the sixth year.

1. Molares, at the age of six and a half years.
2. Middle incisors, seven and a quarter years.
3. Lateral incisors, seven and a half years.
4. First bicuspides, eight and a half years.
5. Second bicuspides, ten and a half years.
6. Cuspids, or eye teeth, thirteen years.
7. Second molares, fourteen and a half years.
8. Wisdom teeth, twenty years.

Teeth can be easily preserved as long as life lasts, if taken in time, or as soon as decay commences, if they are thoroughly cleansed and filled with gold, scientifically. If, however, the minutest particle of decay is left in and the filling placed on top, in a short time it becomes loose, as the decay continues, and the filling falls out, after which it is much more difficult to accomplish the object. Still, with the mineral preparation that I am about to show you, such teeth may be made to last as long as the owner of them. One of the phials on the table contains a pure silex and the other a liquid; by combining these two a soft paste

is the result, which may be placed in the tooth, and the moment moisture comes in contact with it hardens, and immediately becomes part and parcel of the tooth; it is white, pure, permanent, and precisely like the tooth, and if the nerve is exposed it allays its susceptibility to pain.

The teeth are integral and component living portions of the human system, as much so as the heart. They are nourished by a circulation of blood through them. The cause of decay in teeth is the gradual wearing off of the enamel and grinding surfaces, which, without pain, become so short in time that the alveolar processes discharge their duties. Animal food and warm drinks are probably detrimental to teeth, from the fact that the North American Indian who subsists chiefly on corn, vegetable diet and cold meats, has fine teeth. Southern negroes, whose diet is chiefly vegetable, are remarkable for the regularity and whiteness of their teeth. The same fact is observable among cattle fed on natural and unnatural food.

Before I left the country, I examined the teeth of my cows and oxen, fed on natural food. They were covered with enamel, free from tartar, healthy, firm, the alveolar processes sound, and breath sweet. On examining, a short time since, the teeth of cows fed on hot swill from a distillery, I found them broken off; the enamel entirely gone, and black spots on the sides of the stumps left, ulcers at the roots, and the interstices between the teeth covered with tartar, filled with living microscopic matter.

During childhood infants should be confined to milk, as is indicated by the fact that they have no teeth before they are six or seven months old; still I have seen them fed meat long before that period. At two years old their first set is complete, consisting of ten in each jaw; at eight years old these are shed and permanent teeth appear. At the age of twenty the wisdom teeth generally appear. At the age of forty half of them at least have disappeared. Still this need not alarm those who have been so unfortunate, as dentistry has arrived at such perfection that the mouth may be fitted with a new set, scarcely to be distinguished from those formed by nature. A few years since this feat could not be accomplished, except with teeth made of bone or ivory, which were acted upon by the gastric juice, changed color, and rendered the breath disagreeable; now, perfectly incorruptible minerals are used, which bid defiance to all chemical agents, and may be considered a vast improvement in dentistry.

The science of dentistry, practically speaking, should be divided into two branches, mechanical and surgical; to the former belongs the insertion of artificial teeth, to the latter operations upon living teeth. One individual usually practices both these branches, which is wrong, and prevents them from arriving at perfection in either.

Cleansing the teeth with instruments is necessary when foreign substances, such as tartar, &c., adhere to them, which invariably excites an unhealthy action in the peosteum and gums, and if not eradicated will in time loosen the teeth and cause them to fall out. Not longer ago than yesterday a fine, hale, healthy-looking man complained to me that his teeth had nearly all come out, one after another, in a perfectly sound state. I considered this remarkable, and asked him to let me look in his mouth, when the cause became manifest. Those remaining were completely covered with tartar, and he confessed that he had never cleaned his teeth.

Mal-practice to a great extent once prevailed among dentists who cleaned teeth with instruments, consisting in wounding the enamel; this unpardonable error seldom occurs now. Many teeth are destroyed by the use of powders containing acids and hurtful chemical agents, which decompose the agglutinating principle by which their bony substances are combined together. Charcoal rendered fine, or chalk, are probably the most simple and best dentrifices that can be used. A hard brush dipped in luke warm water and covered with either of the substances named may be used before breakfast, perpendicularly, longitudinally, internally and externally, and after breakfast a soft brush with plain water will be sufficient. The same may be used before retiring at night.

Extracting teeth is a performance that requires great skill, and judicious application of the forceps; which should always be used instead of the turnkey, from the awkward and careless use of which latter instrument, fatal consequences have often resulted.

If the laws of digestion were not violated, it would probably be unnecessary either to pull, or file teeth, which receive their first injury from the digestive organs when the stomach is overloaded with indigestible animal food, the gums become soft, and all the other membranes of the mouth diseased, which produces incipient decay in the teeth, hot tea, coffee, and viands generally,

injure the teeth, so do excessively cold liquids, a lump of ice held in the mouth for a few seconds will cause excessive pain, so will a spoonful of hot water. Fluids of a higher temperature than our blood should not be taken into the mouth. You often see persons eat a hot dinner, and then indulge in ice cream, which practice will ultimately produce decay in teeth. The alternate use of cold and hot substances is always injurious, not only to the teeth, but the whole animal economy of man. The construction of human teeth shows that man was originally intended to be a vegetable eater, the teeth of monkeys and apes more nearly resemble ours, than any other animal, and they are known to be frugivorous.

The primeval races of man did not eat meat, the Athenians and Arcadians lived on figs and acorns. The Lex Licinia and Lex Fannia of the Romans on food, permitted meat to be used in very small quantities. Lycurgus, the great law giver, forbade his subjects the use of fatted meat, for the reason that it tended to corrupt their natures, destroy their bodies, and ruin their teeth.

Porphyry of Tyre, the platonist, said that robbers, tyrants, and murderers, never proceeded from those living on vegetables; but invariably from meat eaters. Porphyry likewise says the ancient Syrians and Greeks lived entirely on a vegetable diet.

Lord Bacon said that it was approved by experience that a spare and almost Pythagorean diet, such as is either prescribed by the strictest monastic life, or practiced by hermits, is most favorable to sound teeth and long life. The Eastern Christians who retired into the deserts, lived on twelve ounces of vegetable food, and cold water ad libitum, per day.

St. Anthony lived 105 years on bread, water and herbs; James, the hermit, on similar diet, lived 104 years; Arsenius, 120 years; Romouldus, 120 years. Spotswood says that St. Mungo, after whom the celebrated well in Wales is named, lived to 185 years, he never tasted wine, and always slept on the ground. Henry Jenkins lived 169 years on a low, simple diet. Thomas Parr lived 152 years on bread, milk and cheese.

Dr. Liston mentions eight persons in the South of England, the oldest of whom was 140, and the youngest 100 years. I suppose all these people had good teeth, otherwise their food would not have been well masticated, and indigestion would have destroyed them in early life.

Owing to the present style of living, natural teeth have become subject to so numerous diseases that whole lives are spent in suffering by a very large class of people, many of whom find it quite difficult to explain the causes, because they are not aware that the organism of the human frame is so intimately connected, by means of nerves and vessels, with the teeth as it is. Every variety of food that acts on the body injuriously, exercises a wonderful influence upon the teeth, by inflaming and rendering spongy the gums in which they are imbedded. If you examine a sound tooth in the mouth, you will find the top much whiter than the rest, because nature has placed there double the quantity of enamel, which is protected by a peculiar cuticle, enabling it to perform, without apparent wear, if kept well cleaned, its overwhelming duties for a long period of years. The root of a tooth, or in fact all that portion covered by the gum, is unprotected by enamel. When a tooth is painful to you, have it examinedby a microscope, and the manipulator will first discover a dark covering over a small portion of the tooth, on removing which carefully, a nest full of animalcules will be presented to his amazed sight; as these minute organisms increase in size, the enamel cracks, putrefaction and decay then rapidly increase, until the nerve becomes exposed to atmospheric influences, when infusoria, enlivened by the breath of heaven and the subject, revel in the work of destruction, until that beautiful member, so admirably designed by nature to masticate and divide the different matters requisite for the support and maintenance of life, becomes a mouldering bone, arrayed with gangrene and tartar, and filled with insect life.

After this terrible catastrophe has taken place, substitutes for the original must be found, and as the alchemists of old, attributed to the precious metals sanative powers, the dentists of the present age have called to their aid, platina, gold and silver, as appropriate substances to form the plates for their so-called "incorruptible" teeth.

I am convinced, in my own mind, that experience will ultimately discard them all, and that some new substance will be discovered to take their place, for the following reasons: The gastric juice of the human system possesses acid qualities in consequence often of sickness, bad digestion, &c., which oxydates metals rapidly, and particularly silver. Gold, if it were possible to use it unalloyed with copper and silver, would not be so subject, but then it would be devoid of the requisite firmness, and there-

fore unfit to form the basis for artificial teeth. Platina is not subject to this objection, as acids do not oxydate it, still it produces a metallic taste in the mouth which irritates the salivary glands and injures digestion.

Metals are admirable conductors of heat, and often cause a disagreeable sensation when hot food enters the mouth, or cold air comes suddenly in contact with them.

Then again the specific gravity of metals renders them unfit for the purposes of dentistry. Platina is exceedingly heavy, and very flexible, which overbalances, to a certain extent, its non-oxydation qualities.

What we require is some tasteless composition, that will not excite the glands, create a disagreeable sensation in the mouth, or emit odor. It must be a bad conductor of heat, not liable to solution, corrosion or oxydation, by the action of the gastric juice of the stomach, and capable of bearing any degree of heat and cold. It must not be liable to bend, or get out of shape, and must hold the teeth without cement or solder; to accomplish this end, the composition will necessarily have to be soft and pliable when the teeth are united with it, and become hard and compact afterwards. And as the gums always shrink after the loss of natural teeth, the composition must be such as to imitate real gums, be light, capable of plastic formation, and easily fitted without clasps. When this desideratum is acquired, the alveolar sockets may be deprived of their dead roots, inflammation of the jaws, swelling of the face, and irritation of the nerves entirely dispensed with, and the constituent parts of our systems would soon harmonize perfectly with this new and pure body.

GAS BURNING.

Prof. Hedrick.—Nitrogen dilutes gas and lessens the value of it. Gas varies from day to day, and we scarcely ever burn the same kind of gas. Hydro and carbon is the general illuminating gas that we burn, and the more carbon it contains the better it is. Gas always contains free hydrogen, but if it has enough of carbon in it it will give a good light. What is called the olefiant gas, is the best burning gas that we have.

The Chairman stated that he was informed at the Manhattan Gas Company, that gas traversing a length of pipe, say one and a half miles, produced what is called vegetable decomposition. He

wished to know whether the manufacture of gas at private houses was attended with satisfactory results.

Mr. Hedrick thought it was.

The Chairman suggested that they pass from the subject of the composition of gas, to the examination of the consumption of gas.

Mr. Johnson produced a number of burners—fifty in all—for the purpose of experimenting on them, and went into a minute description of each of them.

Professor Mason stated that from information which he received mainly from the Manhattan Gas Company's office, he had noted the following points:

1. That a yellowish red light is the best for the eye.

2. That one burner, rather than many, is better for a given quantity of light, when it is practicable.

3. That the flow of gas should be regulated automatically. It is necessary that there should be a slow escape, and that the flow should be regulated by some arrangement independent of the street pressure, and independent of the hand. That is considered by the company as the main thing to be sought for, and upon which the economy of gas burning must ultimately depend, because we know that human carelessness is just sufficient to produce all the evils of gas burning, unless the flow is automatically regulated.

4. Gas can be made economically by the companies just in proportion to the perfection of the instruments for regulating the flow.

Mr. Seeley agreed with the President that the thing to be sought for is a self-regulating burner. By experiments he had ascertained that whether the pipe was partially blocked up at the point of exit, two or three feet from it at the metre, or the other side of the metre, the result would be the same. He explained Thompson's regulating burner, and stated that he had experimented on two of them, and on one of the best ordinary burners now in use, with the following result:

Pressure.	Thompson's.		Ordinary Burner.
.5 inch.	5½ ft.	6.6	1.3
1.0	6½		3.2
1.5	7	7.7	4.1
2.0	7.2		5
2.5	8	8	6

The loss of light by the use of shades of any kind, and particularly those of ground glass, is very considerable. Mr. William King of Liverpool presents the following results in the London Journal of Gas Lighting:

Description of shade.	Loss of light per cent.
Clear glass	10.57
Ground glass (entire surface ground)	29.48
Smooth opal	52.83
Ground opal	55.85
Ground opal, ornamented with painted figures, the figures intervening between the burner and photometer screen	73.98

Recent experiments by Mr. Frank H. Storer, for the Boston Gas Light Company, show even a greater loss of light. He obtains the following results:

Description of glass.	Thickness of glass.		Loss of light, per cent.
Thick English plate	$\frac{1}{8}$	of an inch.	6.15
Crystal plate	$\frac{1}{8}$	"	8.61
English crown	$\frac{1}{8}$	"	13.08
Double English window glass	$\frac{1}{8}$	"	9.39
Double German window glass	$\frac{1}{8}$	"	13.00
Single German window glass	1-16	"	4.27
Double German, ground	$\frac{1}{8}$	"	62.34
Single German, ground	1-16	"	65.75
Berkshire (Mass.), ground	1-16	"	62.74
Berkshire, enameled, i. e., ground only upon portions of its surface—small figure	1-16	"	51.23
*Orange-colored window glass	1-16	"	34.48
*Purple-colored "	$\frac{1}{8}$	"	85.11
*Ruby-colored "	1-16	"	89.62
*Green-colored "	1-16	"	81.95
A porcelain transparency, (Tyrolese Hunter)	1-16	"	97.68

The greater portion of this light which is lost is converted into heat.

THE CUT-OFF IN THE STEAM ENGINE.

Mr. W. A. Bartlett moved that the subject for discussion the next evening should be the "Theoretical and practical value of the cut-off in the steam engine."

Adjourned to Thursday evening next, June 21, at 8 o'clock.

* As used for church windows, &c.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
June 21, 1860.

Professor Mason in the chair.

GRANULATED CORK.

S. W. Smith produced a specimen of granulated cork, called in commerce, cork wood. He stated that among its other qualities it was a non-conductor of heat, and was now used for lining the under part of roofing for the purpose of keeping the upper rooms cool. It has also the effect of deadening sound, and is a non-absorbent of heat. It is used in packing fruit, &c.; also, in refrigerators. Fifty pounds of ice placed in a refrigerator lined with cork has been known to remain entire, without melting, for the space of ten days, while, in one without cork it would melt in a few hours. It is manufactured by being simply ground in a mill, and can be supplied at the rate of fifty cents per barrel. The weight of a barrel full of this cork is eighteen pounds. Cork wood, as it is called in commerce, is the outside bark of the cork tree.

Chairman.—How does the cost of this compare with charcoal?

Mr. Smith.—Charcoal would be cheaper.

Chairman.—What is the relative value of this cork compared with charcoal, as a non-conductor?

Mr. Smith.—I think charcoal is rather better than the cork. My experience with charcoal in the manufacture of refrigerators is, that the charcoal retains the moisture. It is not a costly job to pack refrigerators with this cork. A barrel will not compress half a bushel.

The Chairman.—The weight of charcoal used in packing a railroad car is about 2000 pounds, which is a fatal objection to its use, this cork would prove an excellent substitute, on account of its lightness.

ARTIFICIAL LEATHER.

Mr. Pennyman produced a sample of what is called artificial leather, made from the parings of harness, &c., and stated that it was manufactured in the manner that paper usually is. This is furnished at eight cents per pound, and can be made entirely water-proof. It is manufactured at Anherst, Massachusetts.

Mr. Fisher.—Can you put this into any form you please?

Mr. Pennyman.—It is only made at present in large slabs the same as bristol board, but I believe that there could be machinery made to put it into any form you please.

The Chairman stated that Prussia was the only nation that required the soldiers to produce their old shoes on getting new ones.

The Chairman stated that he had packed the roofs of his barns with saw-dust, but found it produced dry rot, and had to take it all out, although it was only there for two years, and he believed that if this cork would obviate this difficulty, it would be a very valuable article to the public.

The Chairman nominated, as a Committee to examine into the merits of this cork—Professor Mason as Chairman, Mr. Garvey and Mr. Guild.

RULES FOR THE POLYTECHNIC CLUB.

Mr. Garvey read additional rules for the Polytechnic Association, adopted by the Committee of Manufactures, Science and Arts, as follows:

"American Institute, Committee of Manufactures, Science and Arts, *June* 18, 1860.

The Polytechnic Association of the American Institute having petitioned this committee for additional rules to govern their proceedings and the business coming before that body, it is therefore directed that the following shall be the rules, in addition to those now in existence which do not conflict therewith, for the government of the Polytechnic Association:

First. Every member of the American Institute shall become a member of the Polytechnic Association, by signifying his intention to the chairman thereof.

Second. The name of any person eminent in practical mechanics, engineering, mathematics, astronomy, chemistry, natural philosophy, social philosophy, geology, mineralogy, practical mining, meteorology, natural history, manufactures or the arts, may be proposed by the members of the Association (by ballot, five-sixths of those present voting affirmatively) to be an honorary member of the Polytechnic Association of the American Institute; and when so proposed, if approved by the committee of manufactures, science and arts, of the American Institute, a certificate of membership shall be issued by said committee.

Third. The Chairman of the Polytechnic Association is authorized to arrange sections, or standing committees, embracing all the physical and exact sciences, particularly those named in section second of those rules, and to appoint a committee for each section, who shall report the doings of the sections to the Association. Members, and honorary members, shall be entitled to seats in those sections.

Fourth. The Chairman may invite any person to address the meeting or to participate in the deliberations, but such person not a member shall be announced as a visitor.

Fifth. Topics presented for consideration, or the announcement of a discovery or invention, improvement or novelty, or the exhibition of any machine or part thereof, or any manufacture or article, must be preceded by a statement setting forth the point, in writing, to be deliberated upon.

Sixth. Any person desiring to put on record any supposed or real discovery in science, manufacture, or arts, may address a communication to the chairman of the Association, under seal and properly endorsed, which shall be preserved in the archives of the American Institute as evidence for the party depositing the same.

Seventh. In all cases not provided for by the rules, Jefferson's Manual shall be taken as a standard.

Eighth. The official reports of the meetings of the Association, shall lie upon the desk of the recording secretary until 11 o'clock of the day following the meetings, for the inspection of members, and such corrections as are necessary before going to the public press.

Ninth. The minutes of the previous meeting shall be read at the opening in order for correction, unless otherwise directed by the meeting."

GAS BURNING.

Mr. Johnson produced an old English standard gas burner, and stated that all burners of the same class became very hot after being lighted for a few moments. The heat, half an inch over the glass of one of these burners, was sufficient to make platina red hot.

Mr. Johnson experimented on a French burner, manufactured in Boston.

CUT-OFF IN STEAM ENGINES.

Mr. T. D. Stetson, in opening the regular subject for the evening, "the actual and theoretical gain, in effect due to the use of the 'cut-off' in steam engines," expressed a strong belief that there was a gain in its use, but not as great as the ordinary theory would indicate. Mr. Isherwood, a high authority among steam engineers, and several others, were reported as believing there was no real gain. He hoped to hear the subject thoroughly ventilated here. Nine thousand locomotives, between one and two thousand larger engines on steamboats, and an immense number of stationary engines, were working in this country alone, with more or less elaborate and complicated machinery

for cutting off the flow of steam into the cylinder before the end of the stroke, and the Association could not discuss a question of more practical importance to the industry of the country than the one now before it. Mr. Stetson briefly explained the principle involved, and the general theory advocated by engineers. He believed the principle was often misapplied in small engines, (and carried too far), but when applied judiciously, thought there was always a decided gain.

Mr. Rowell said Mr. Isherwood had demonstrated to his own complete satisfaction, and had set forth in a late work (Engineering Precedents) that there was never in actual practice any gain in economy by the use of the "cut off." Engineers had been mistaken; the theory looked very well on paper, but, in practice, no gain had ever been realized.

Prof. Hedrick explained still further on the black board the principle as generally understood, without expressing any matured opinion on either side.

Prof. Mason concurred in the belief that the subject was one of more than usual importance, and, on motion of Mr. Hedrick, appointed Messrs. Hedrick, Rowell, and Garvey, as a committee to collect the facts on the subject to be presented at the next meeting.

Adjourned to Thursday evening, June 28, 1860, at 8 o'clock, P. M.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
June 29, 1860.

Prof. Mason in the chair. The meeting was called to order at the usual hour.

GRANULATED CORK.

S. W. Smith produced a sample of corkwood sapling, and stated that when the tree arrives at a certain age the cork opens readily, but if the cork gatherers attempt to gather it before that time they damage it materially.

THE GREAT EASTERN.

James Montgomery drew the attention of the committee to the Great Eastern, and all the large steamers since the commencement of ocean navigation. He stated that Brunell and others have been considered foolish for building such a large steamer. Some think her a failure; many thought the Great Britain a

failure, but she is in existence to-day, a staunch ship. This Great Britain was the steamer which went ashore on the Irish coast, and lay nearly two years exposed to storm, yet she is now running to Australia and other ports. Now we have the Great Eastern, the greatest triumph of genius that this age can boast of, a ship which stamps her projector with immortality. It is impossible to sink her, because she is stronger than the sea, and made of good wrought iron, hermetically sealed. Some say she will rust out, but that cannot come to pass, as her bottom will become covered with barnacles, which will preserve her. Cast her on a lee shore, and although half her compartments may be broken into, a thing not likely to happen, yet she will still survive. If the whole of the British navy had been exposed to the winter of the year during which the Great Eastern was exposed, they would be all destroyed. He stated that he was in Liverpool in 1846, when the Great Britain came in after being ashore, and had her bottom bilged in, which, however, did not do her any material injury, as she is still in existence. Put her in the cliffs of Dover, exposed to the roughest storms, and she would still weather it out. That Dr. Crosby had measured the sea, and found that the greatest blow it can strike is 30,000 lbs. to the superficial foot of 144 inches; that it is impossible for her to be lost, and unless a man falls overboard or down the hatchway, he would be as safe on board of her as he would be on shore, and that it was the interest of railway companies to patronize her. He concluded his remarks by saying that she had not made an extraordinary fast run from Southampton to New York on this her first trip, but expected that when she had a clean bottom, and was cleansed of the barnacles which adhered to her keel, she would make the passage in eight days.

Mr. Fisher produced a tube of No. 25 wire gauge, one-fifteenth of an inch in thickness, which he stated could be made water-tight, and wished to know what is the maximum thickness that a tube can be made of, so as enable it to bear a maximum pressure of 200 pounds.

CUT-OFFS IN STEAM ENGINES.

Mr. Rowell stated that Mr. Hedrick wished to have the matter of the "cut-off" delayed, as he had not called the committee together. He then read a paper which contained the result of some experiments made on the subject of using steam

with and without expansion, but owing to a mistake in one of the calculations the paper was laid aside, and stated that in his opinion there was a saving of 17 per cent by using steam at a full stroke. He also read another paper relative to the United States steam frigate Wabash.

Mr. Corlies stated that he claimed a power by which can be regulated the power of the engine, which was only a simple adjustment. In the experiment made on two engines at the Metropolitan Mills, he (Mr. Corlies), after looking at a card from the engineers, said he could not do anything to improve them. He also alluded to the Ocean Steam Mills and the James Mills, and stated that a gentleman spoke to him the other day, and stated that his engines were working at a half "cut-off," which was giving him entire satisfaction.

Mr. Seely.—I think it is time to hear a little from the other side. The only thing for us to know is, what is claimed for the "cut-off," and what is gained by the use of it. All machinery is driven by force—force is what gives motion. If you put a weight on the ground it remains without motion. You may have what amount of steam you like in your boiler, but unless you open your port you receive no gain from the use of it. In the old-fashioned cylinder, where we do not use the "cut-off," you drive the piston to the bottom. If you want to save twenty-five per cent. you must use the "cut-off;" and if you wish to get the utmost work of an engine you must use the whole stroke.

Professor Mason.—I have a particular engine which I desire to work for the next three months, and I desire to know by what means I can get the full amount of its power.

Mr. Seely.—To do so, the stroke must be used at its full length. It is well understood that the condensing engine is the most profitable, except in reference to friction. If you gain twenty-five per cent. by the "cut-off," you may gain ten per cent. by friction. Steam should be cut off in such a manner that at the end of the stroke it lose all its power.

Mr. Montgomery.—The full value of each foot of steam is well understood. On 1212° of steam we get 10 atmospheres. The Cornish engine had become valuable for pumping a certain amount of water in a given time; it has the preference in England, and also in this country. Some writers have attempted to state that the loss from radiation is not very great, but this is a great mistake.

Mr. Rowell stated that he had been told by a gentleman that there was a loss of eighteen per cent. by the radiation of steam. He also stated that the limit of expansion should be controlled by the power of the engine; that the greatest loss was sustained by the heating around the cylinder, and, that the screw-propeller was denounced by many as a humbug, but that we would see the day, which he believed was not far distant, when no other mode of propelling would be adopted.

The Chairman.—The question of how soon we will make iron for Europe, instead of Europe sending her iron to us, gathers around this question. The great prosperity of this country lies in the development of the mineral and vegetable products of the country.

Mr. Dibben.—Mr. Isherwood did not pretend to say that expansion was not economical. He said that the result of some experiments made in the Brooklyn Water Works was, that there is a saving of forty per cent. by the use of steam expansively.

Mr. Montgomery, in alluding to an experiment made on the "Wabash," stated that the result of it was so contradictory to the principles of science that he should infer there must have been something the matter with the steam apparatus. He went on to explain the advantage of using steam at a high pressure. He stated that the latent heat of steam under the pressure of one atmosphere is nearly 1000 degrees, to which, if we add the 212 degrees sensible heat, we have a total of 1212 degrees. Under a pressure of 10 atmospheres, or 150 lbs. to the inch, the sensible heat will have increased to 359 degrees; but the total heat will not be 1359 degrees, it will be as before 1212 degrees; the latent heat becomes less as the sensible heat increases under high pressure. The Cornish engine had become celebrated for its value, simply because it introduced the "cut-off."

The President enquired whether the Cornish engine was not used in preference to others in all mines?

Mr. Montgomery.—I know of no others in use in mines.

Mr. Rowell, in referring to the experiments at the Metropolitan Mills, stated that they had kept one of the engines at full pressure, with steam in the cylinder all day, and he found that although clothed as effectually as possible, it required 18 per cent of the heat that was required when it was running under the same pressure.

Mr. Montgomery.—There should not only be a steam-jacket

around the cylinder, but the steam in the jacket should be superheated steam, to be heated just enough to make good the loss. The means for doing this had been patented in Europe.

Mr. Dibben.—In the Brooklyn Water Works there is an engine pumping water with a counter weight attached to it.

Mr. Rowell.—I am informed that in all the Cornish mines they use the half stroke.

W. A. Bartlett said, in reference to the committee of organization, that they had secured the adoption of the rules proposed by the Polytechnic Association to the committee on arts and sciences. He moved an adjournment to the first week in September.

A member.—That an adjournment for so long a time would be a loss to the Association, and, therefore, he moved an adjournment for two weeks, which was carried.

Adjourned to Thursday evening, July 12, 1860, at 8 o'clock, P. M.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
July 12, 1860.

Mr. John P. Veeder in the chair.

Mr. Garvey presented a new breech-loading pistol, which was capable of being loaded and fired sixteen times in a minute. He stated that there was no danger of a premature discharge, as when the cock was down all danger of a premature discharge was obviated. It was patented by Mr. Stafford of New Haven, Connecticut. Weight of one is 6½ ounces.

CUT-OFFS IN STEAM ENGINES.

Mr. Garvey.—The experiments which were being made by Mr. Isherwood in relation to the cut-offs had to be discontinued in the early part of the week; but they had been resumed his day, and the committee would be ready to report by the following week.

Mr. Seeley produced a specimen of a peculiar kind of coal for the inspection of the meeting, and said that the first thing they had to do was to find out "what it was." It had been alluded to in the American Gas Light Journal, as Bitumen. It would also mark on a wall. If you burn it, it has a smell like fish, and would leave a disagreeable smell after it.

Mr. Fisher wished to know what was the best material to paint an iron vessel with, so as to enable him to carry water in it.

Mr. Johnson said he would get the desired information at the Novelty Works.

The Chairman said there was a species of Bitumen which would answer the purpose required, and stated that 100° would not have much effect in melting it. He had used it in the gutters of his house in the country, and also had it in use on vessels.

Mr. Garvey.—A composition of beeswax and rosin would answer, but would be of little use except in a certain temperature—neither too hot nor too cold. Davy of Dublin had invented a material composed of Asphaltum and Gutta Percha, which was the best in existence for that purpose. It was flexible and must be used in a warm state.

Mr. Churchill stated that he had used it, and found that the gutta percha in commerce was not pure enough for that purpose. He alluded to a composition which he made by infusing rosin in a crucible along with some beeswax, and then adding some starch by stirring it in. It adheres very firmly to glass. He had used it for that purpose last winter, and found that it had adhered most rigidly ever since. He had also substituted lard for the beeswax, and had even instilled ether into it, and found it very good.

Mr. Garvey had used it, and stated that the more beeswax was used, the less brittle it became. He had also used plaster of paris mixed with wax and rosin, and stated that stone cutters use pounded stone or stone dust mixed with beeswax to mend broken pieces, and they found that it answered all purposes. It is not reliable in heat of a stronger temperature than 120°. In a heat of 130° or 150° it would not be in any way reliable.

The Chairman suggested the use of boiled linseed oil with rosin and beeswax. He stated that it could be used at first with a brush, and afterwards it became very tenacious. He had used it on the limb of a tree. It could be bought of the Franklin Coal Company.

STEAM CUT-OFF.

Mr. Hedrick said it was understood that he was to take the theoretical part of the subject, and wished, if there were any gentlemen present who intended to speak on the facts of the case, that they would do so.

Robert Humphries said that the chief engineer of the Metropolitan Flour Mills, in Cherry street, had stated to him that he

had taken off all their "cut-offs," and that they were saving ten per cent by doing so. The saving in the Hecker mills was caused by stopping three of the cylinders. He contended that in a thirty-six hours experiment there would be a saving of ten per cent by using steam expansively. If you put in an engine built by Corlies & Nightingale, of the same power of the six in use in Hecker's mills, there would be a saving, not only of ten per cent, but a saving of thirty per cent.

Mr. Humphries said that the engines in use at the Metropolitan mills were perfect in every particulor. He wished the committee to ask, when they went to the Metropolitan mills, why it was that they could not make flour as cheap at the Metropolitan mills as they were doing at the Croton mills.

Mr. Hedrick said that when you use two engines you have twice the waste as when you only use one. He found, on looking at the books, that on one machine the waste was seven-tenths, and stated that when they balanced the waste of the two engines with that of condensation, they would find the result that was desired. Mr. Dibben stated that steam was used in this city at 90 lbs., cut off at one-sixth. If you follow all the way on one engine you do more work than with two cutting off at one-sixth. There is a saving in using steam expansively and not super-heated. He referred to an experiment made in London by cutting off at two-sevenths, and found that the gain would be about twenty-eight per cent., and at one-fifth it would be about nineteen per cent. As soon as you expand steam against a resistance it will make water, and if you expand it in a vacuum it will remain steam. These experiments now making amount to nothing unless compared with one made in a large cylinder.

Mr. Humphries stated that he was in favor of using steam expansively.

Mr. Fisher said that he heard it stated that a steam vessel having one of its cylinders disabled, that she ran better with only the one. He believed that the Hecker mills were not properly loaded. He always heard that it was better to leave the throttle valve open. He stated that when steam is admitted at 120 lbs. pressure to a ten inch stroke, the gain was greater than using 60 lbs. pressure at five inch stroke. It has been found that by using the variable "cut-off" a saving was effected in fuel of one half. On a railway in England they had made a reduction in the use of fuel from 49 lbs. per mile to 22 lbs.

Mr. Bartlett.—It is impracticable to use steam at the full stroke; four-fifths was the general point at which steam was cut off. All those that speak of the use of steam expansively say you must have a cylinder large enough for that purpose. Mr. Isherwood insists that the experiment of the two cylinders is the most perfect.

Mr. Humphries.—Experiments must be made on one cylinder, and one only.

Mr. Charles Wright said he had twenty years experience in this business, and his opinion was, that a single cylinder was, in every way, advantageous, both in its first construction and after use.

Mr. Vance requested the attention of the committee to an engine in use at his works at the corner of Twenty-fourth street and Tenth avenue.

Mr. Fisher moved that a committee be appointed to examine a steam carriage that he had in construction.

The Chairman appointed Messrs. Sykes, Haskell and Vance as a committee for that purpose.

Mr. Garvey moved that the subject of the "Great Eastern" and "steam cut-offs" be brought up for discussion at the next meeting.

Adjourned to the second Thursday of September, at 8 o'clock P. M.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
September 13, 1860.

Prof. Mason in the chair.

CUT-OFFS.

Mr. Rowell.—On the Chancellor Livingston they had an arrangement by which they could vary the half stroke to the full stroke, and he requested of Mr. Walker, the chief engineer, to be allowed to make an experiment on board of her, which request was granted, but on account of the shortness of the trip they concluded not to do so.

Prof. Mason stated that at a future meeting a report might be expected from the superintendent of the New Jersey railroad, of experiments which were made on that road, upon the application of electricity to the periphery of the driving wheels of locomotives, in order to increase the traction of the engines and prevent the wheels from slipping when drawing heavy loads up

inclined planes. The superintendent had informed him that upon one occasion the engineer in charge of a locomotive, with a heavy train attached, was instructed to leave off his sand box, and when he came to a heavy grade to obey the instrctions of a man who was to accompany him. Accordingly the engineer did so, and on arriving at a steep grade the momentum of the cars stopped and the wheels slipped. After several unsuccessful attempts to start the train ahead, showing that the grade could not be surmounted without some additional application, the man in charge directed the engineer to turn a handle, and the moment it was done the wheels stopped slipping, and the heavy train moved forward without the application of sand. The electricity generated in front of the smoke pipe of the engine, so as to bind the wheels to the rails, thereby causing a saving of 10 per cent.

W. A. Bartlett said that as they were lately shocked by so many persons having lost their lives for the want of a proper light, he thought the subject was worthy of consideration. In France they organized a commission, to which all lamp manufacturers were requested to furnish a lamp for the navy and commercial purposes. One was furnished on the Fresnel Cata-dioptric principle, which was adopted in France, England, Holland, Russia, &c. He was of opinion that if the schooner had been provided with one of those lanterns instead of the one they generally use in that class of vessels, the accident would not have occurred. Captains think that if they have a *small* vessel they will only require a *small* lantern. If the steamer had been struck by a large or high vessel, instead of the *low* schooner, the accident would not have been so fatal, for the reason that she would have been struck *above her water lines* and not at them. We have to-day over 500 of the Fresnel illuminated in light houses, but owners of small vessels persist in burning small lamps, consequently a light had to be manufactured to suit their wishes. A lamp not costing over $10 to $15 is manufactured in France sufficient to be seen at a distance of five miles from a vessel's deck fifteen feet above the water.

Mr. Fisher thought that an insufficient watch was another cause. He was of the opinion that some law ought to be passed compelling them to keep sufficient watch.

Mr. Garbanati thought that out of the number of vessels that have been reported missing, if they carried sufficient light these accidents would not have occurred. A vessel of three

masts ought to carry a light on each masthead to indicate her size. He also thought that neglect of duty should be punished in this country as in England—if that was done, we would have less accidents occurring.

Mr. Bartlett admitted that there was very great negligence in the look-out. Ships should be illuminated so as to be seen at a farther distance than a close proximity. If the schooner Augusta had a light at her masthead the accident might have been avoided.

The chairman said that no place exceeded the Hudson river for carelessness. He had seen sixty of these vessels in a lump, and saw one pushed ashore the other evening, with a cargo of coals on board, in endeavoring to dodge another, manned by a set of men so ignorant that instead of getting assistance to get her off, they set to work and shovelled off seventy-five tons to lighten her. His men afterwards collected twenty-five tons of it and sold it to the neighbors.

Mr. Garbanati said that nearly every vessel which left the port left without her full complement of men. A vessel requiring a crew of twenty-four men, would have twenty, and so on in proportion.

Mr. Fisher suggested that the American Institute might take into consideration whether large ships might be built with advantage. He should recommend that this subject should be looked into.

Dr. Dibben.—It is conceded by all engineers that a large ship could be built to carry a large number of persons cheaper than a small one. The Great Eastern has good engines and good machinery. In her engines they cut off at one-third. The aggregate horse power is 7,106. Coal burned during day, 272 tons. On the side wheel was a strap by which one wheel could be disconnected from the other. Onother peculiarity she has is a peculiar lubricator in both engine rooms. The application of power by the "Great Eastern" was worthy of notice—at the stern by the screw, and at the side by the wheel.

Mr. Mason inquired of Mr. Dibben if he did not think that the wheels were put a little too much forward.

Mr. Dibben.—I think they are.

Mr. Mason wished to know if there was any fixed law by which the highest amount of speed could be obtained. Capt. Anderson, of the Thomas Powell, stated that he would enter into a contract with any ship-builder to build him a steamer, for which he would

be willing to pay him $5,000 along with the contract price if he would construct her so as that she would make the trip to Newburgh in fifteen minutes less than the Thomas Powell does—the Thomas Powell's time being three hours and fifteen minutes. If that could be accomplished he (Captain Anderson) would take $10,000 a year extra from the railway.

Mr. Mason stated that he was told by a young nobleman who came out in the Great Eastern that they scarcely knew what sea sickness was on board of her, and wished to know whether a steamer could be built large enough to obviate sea sickness entirely.

Mr. Bartlett admitted that there was less sea sickness on a large ship than a small one, but believed that if any person was to undertake to build a ship so large that he could guarantee passengers from sea sickness, that old Neptune would put in a protest against it. He believed that steamers exceeding 5 to 6,000 tons would not be serviceable in a commercial point of view. He thought the Great Eastern was too large, and that she would endanger any military purpose that she might be put to if her whole capacity was to be used.

Mr. Seely gave notice that at the next meeting he would introduce the subject of a new dye called "Anniline."

Adjourned until Thursday evening, Sep. 27th, at 8 o'clock, P. M.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
Sept. 27, 1860.

Professor Mason in the chair.

Mr. Seely proposed to introduce, at the next meeting, an electrical light to be used as a substitute for gas light. He stated that there was one in use in London at the present time, as a test one, and that it had neither heat, smoke or smell.

The Chairman asked him if it was proposed to procure an available light without carbon.

Mr. Seely said it was, and that there was no consumption at all in the light which he intended to introduce.

Adjourned until Thursday, Oct. 11, at half past seven o'clock.

The subjects for discussion at the next meeting will be the "cut-off," in steam-engines, and Mr. Seely's new light.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
October 11, 1860.

Professor Mason in the chair.

Before the meeting proceeded to the usual business, as there were not many members present, the Chairman made a few observations relative to the growth and increase of this country in wealth and population, and related an anecdote of an individual who died, and left $300,000 for the purpose of carrying out the juvenile population of this city to the rural districts, when $300,000 more could be raised for that purpose. He thought that the sentiments the Prince of Wales would carry with him to England in regard to this country, would be the means of cementing the good feeling that already exists between the two countries.

CUT-OFF.

Mr. Hedrick said that their report on the subject of the "cut-off" was not, as yet, completed.

Mr. Bartlett read a paper on the natural history of the ostrich. His impression was that the ostriches were in the habit of laying their eggs in the sand and then leaving them to chance for incubation; and stated that the time of incubation was unsettled up to 1857. The paper which he read proved, among other things, that the female bird generally hatched five hours and the male nineteen hours, also, that at the first appearance of a storm the hen would place herself beside the male on the eggs, for the purpose of helping the incubation.

Mr. Fisher enquired what would be the value of the breeding and acclimation of the ostrich.

Mr. Mason replied that it was their feathers.

Mr. Bartlett said that they expected, in France, shortly to be able to produce the ostrich for eating purposes, as well as for their feathers. He did not see any reason why they should not be good for eating, although they lived on rats, snails, &c., and occasionally swallowed nails, pebbles, glass, &c.

Mr. Seely stated that he had seen pictures of the ostrich in harness.

Mr. Dibben said he saw one in harness.

Dr. Stevens said they were eaten by the ancient Romans.

Messrs. Rowell & Hedrick made some illustrations on the black board relative to the experiments they were making in reference to the use of steam expansively, but stated that they had not arrived, as yet, at any conclusive opinion on the subject.

Mr. Rowell stated that he did not know of any book which contained a definite account of the use of steam by expansion.

Mr. Dibben said he had every facility for seeing those experiments which are now making, and from what he has seen he has come to the conclusion that Marriott's law is true. He stated that the great loss in engines was the connection or conduction of heat from the cylinder during the exhaust. Theory and practice, in his opinion, agreed together.

Mr. Rowell:—The theoretical law gives an advantage of 280 per cent. by using heat cut off at one-eighth. We are not assailing Marriott's law, but merely propose to see what the total result of expansion is.

Mr. Seely thought that no weight should be placed on the statements of the gentlemen, as they had nothing new to offer on the subject. He referred them to Cook's Medical Physics, and stated that he did not think the model used by the committee was of much utility, as it required men of very great ingenuity to understand the working of it.

Mr. Hedrick sympathized with the men who were making those experiments. He thought the advantages of the cut-off were not so great as were allowed to it. The losses by the various frictions, conductions, connections, &c., was what they wanted to find out. By comparing them with the "cut-off" and the "non-cut-off" they would be able to find the difference.

Mr. Seeley said he appreciated the value of these experiments on real steam engines, but did not upon the apparatus on which they were now making them.

The Chairman inquired if it was attempted to be shown that there was little or no gain by the cut-off?

Mr. Garvey was of the opinion that those experiments, as philosophical experiments, were greatly in error. The less parts there are to any piece of mechanism the less loss of power. In this aspect alone the cut-off was defective, but when properly applied its advantages have been abundantly established.

Mr. Hedrick moved that the subject stand over until the first of November. The motion was seconded and carried.

The Chairman wished to know if there was any law on the subject of adhesion. He stated that some experiments are now making on a railway by three engines on a wet rail, one working without the sand box, and the other two with it, and that the one working without the sand box was doing very well.

Mr. Garvey said that by making the wheel shaped, any amount of adhesion could be attained, as is proved by the frictional gearing in common use in England. Some time since he devised the plan of making the rims of driving wheels shaped for this purpose.

Mr. Seely suggested as a subject for discussion at the next meeting: "The recent practical applications of magnetism."

Adjourned until Thursday evening, October 18, 1860, at 7½ P. M.

Subject for discussion: "Recent practical applications of magnetism."

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
October 18, 1860.

Prof. Mason in the chair.

The Chairman inquired whether there was any miscellaneous matter which any member wished to bring forward. He would listen to anything that might be said in reference to the subject which was postponed for two weeks, namely: "The use of steam by expansion."

Mr. Dibben made some remarks on the subject, and, in answer to an inquiry made by Mr. Fisher, stated that his remarks were founded on theory. He stated that Mr. Joule has said, in one of his works on the subject, that for every particle of heat he could give so much power, and *vice versa*.

Mr. Rowell.—The simple fact of expansion was the force.

Mr. Hedrick was of the opinion that if you put on heat enough to bring it up to the same heat that was used when it began to expand you would have Marriott's law.

Mr. Seely.—If we talk about this subject we will continue to talk about Marriott's law. Marriott's law says that the temperature after condensation is the same as before.

The Chairman.—Do you mean to say that Marriott did not comprehend the subject that he was dealing with?

Mr. Seeley.—Yes, I believe so. I think it is very clear that sixty pounds of steam would not expand to double its size and give you a volume of heat at the same time.

The Chairman said that he was unable to bring the gentleman to the meeting who was making the experiments on the New Jersey Central railroad. He stated that he was authorized by

him to say, that since the last meeting he had constructed a battery which was now performing its work satisfactorily without the use of the sand box; but that as it had not met with any rainy weather while making the experiment he could not arrive at any definite conclusion on the subject. He had made the experiment by attaching 54 cars to the locomotive instead of 45, which was the usual number used. He stated that the parties would be ready to come forward and explain everything connected with them as soon as they found what the results would be. They informed him (the Chairman) yesterday, that they were moving forward with the work, and hoped to be able to give the railway company a dry wheel without the use of the sand box, and will be able to make the engine perform its work as well on a wet rail without the sand box, as it would with it. All the engines have to draw 54 cars, instead of the usual number, 45. This company, by the increased economy, are now bringing coal to this market and selling it at as low a price as it can be delivered at in Philadelphia.

The Chairman stated it at his opinion that, by the time the next census would be taken, Brooklyn would contain as many inhabitants as New York, and that the Island of Manhattan would be given up to first class houses and large manufactories. A gentleman of his acquaintance who wished to establish a large manufactory had told him that he had travelled West street for four blocks and was unable to find one. He thought that the machine of Eli Whitney had done more for the cotton crop than all the negroes of the South.

Mr. Seely said, in reference to the subject which was set down for discussion at this meeting, that magnetism makes a locomotive take better hold of the rail than anything else, but that one serious objection to the use of it was that there must be a battery on board, and that that would be very unpleasant, and would be clearly in the way; but, at the same time, it would only be a practical difficulty. There is also a practical difficulty in making a magnet of the form of a wheel. If you magnetize the spokes of a wheel you will get very little magnetism in the rim. If your magnet is rusty it may only raise a pound, but if you rub the two ends together you may raise 500 pounds. Take a body that weighs four pounds on the earth and bring it up to a mountain and it will weigh the same.(?)

Mr. Dibben.—By a law of attraction which was in existence, the

attracting power was varied according as the distance was increased, and that that was the only law which was taken into consideration so far. One law was that in case of a magnet working in contact it must have a certain amount of force. The attractive force of a magnet is according as the distance is increased. He thought that the pressure on the substructure of the road would be increased by magnetism. You require to have a perfectly smooth surface to get the full amount of attraction. When this subject was experimented upon in France they had not a sufficient surface in contact.

Mr. Seely.—The last and strongest objection is that the poles are constantly changing, and it is not practicable to change polarity, rapidly.

The Chairman.—Will the tendency to slip of the wheel on the rail be such that a considerable amount of force would be required to prevent the slip? His question was not answered.

Mr. Hedrick thought that if there was any gain it was by the force of the wheel on the rail and then applying magnetism.

Mr. Dibben said that by getting the iron as soft as could be got the first principle of a good magnet would be obtained. Soft iron was necessary for a magnet, and hard iron for the rails.

The Chairman said there was no such thing as contact. He wished to know if the weight of the engine was increased to 20 tons what would be the advantage gained by the increased pressure?

Mr. Dibben did not think it would amount to very much.

Mr. Garvey thought that accurate experiments made with one of the locomotives would be better than all the discussion that could be had on the subject.

Mr. Fisher wished to know what the ordinary rate of travel of these trains was?

The Chairman said it was twelve miles an hour.

Mr. Seely moved that a committee be appointed to investigate the experiments that are now making on the subject? The motion was seconded and carried.

The Chairman appointed Messrs. Seely, Dibben, and Hedrick to act as a committee for that purpose.

Mr. Seely proposed the caloric engine as a subject for discussion at the next meeting. He stated that he was interested personally in the caloric engine, but did not think that that would militate against it as a subject for discussion.

The Chairman said certainly not, and stated that he was asked by several who resided in the same county as himself, why the Caloric engine was not brought more into use, to which he replied that it was for the reason that it worked with a great destruction of its own material.

Adjourned to Thursday evening, October 25th, at half past seven o'clock.

American Institute, Polytechnic Association,
October 25, 1860.

Prof. Mason in the chair.

The Chairman inquired if there was any member present who had any miscellaneous matter which he wished to bring forward for the purpose of occupying the half hour devoted to that purpose.

Mr. Churchill produced and exhibited a specimen of decayed India rubber, and wished to be informed of the reason of its decay.

Mr. Dibben.—The simple reason of its decay is that it was subjected to too high a temperature. If heated to too high a temperature, it will be partially destroyed on the surface. I do not say that it is a mixture which has anything in it to cause it. I should rather say that it was the heat.

Mr. Fisher wished to know how much steam would escape from a boiler with the dampers, shut air-tight.

Mr. Dibben did not think it followed that because the doors were shut that evaporization was to take place at all.

Mr. Garvey said that the answer to the gentleman was very plain, and his position would be well met by taking as an illustration, a tea urn, for in that you put in a red hot iron without any fire at all; whatever heat is got in there is got off at the surface.

Mr. Seely stated that the specific heat varied according to the different kinds of coal that might be used.

Mr. Fisher thought that was no answer.

Mr. Seely.—No definite answer can be given until all the facts connected with it are placed before us. I cannot see that there is anything in the matter at all.

The Chairman proposed as a subject for future consideration, "The most available mode of preserving wood exposed to the weather," and stated that it was not eight years since the New

Jersey Central Railroad was constructed, and that the wooden portions of it at the present time, required to be renewed. On roads where receipts are many thousand dollars a day, a day's interruption in the freight line would be an incalculable evil. If creosote is used, how far can it be deodorised as not to make it offensive to the smell?

CALORIC ENGINE.

Mr. Seely.—I feel a little disinclined for two or three reasons to discuss this subject. The only temporary reason that I have is that my thoughts during the past week have been directed in another channel entirely. I propose to give a history of some caloric engines which I have invented myself. I wish it to be understood, that, although I have operated myself, that many of the important ideas which I have had are represented in journals one hundred pears old. In the caloric engine, the air expands and drives the piston. Here (illustrating) is a receptacle in which the air is to be heated. When this rises, I will have a valve to allow the air to come in. When the piston is risen to the top, the cylinder will be filled with cold air. When a communication is made above and below the piston will be equalized. I made many drawings and supposed this to be a chamber in which the air is to be heated. This is a cylinder enclosing a stove. The air pumped into that will be heated and carried away through here. Here is the pump which pumps the air into the cylinder, and it is carried off here. I very plainly see that if you economically use the product of combustion, you cause a great saving. A great quantity of air always goes into the furnace that is of no use at all; 75 per cent. of the heat does not get to the boiler. In the Ericsson engine, the fire is only at one end, and a great deal of it goes up the chimney. There are, also, several difficulties attached to it; one of them is, that it is difficult to move the ashes without allowing too much cold air to enter into the cylinder. By the application of the Barker mill, this difficulty will be greatly overcome; it will help to overcome the difficulty of the ashes, smoke, &c. The air which feeds a fire is 2000°; the practical difficulty is the ashes and too great heat. If you cause the air to pass through the water before reaching the mill, the water is condensed, and super-heated steam is generated which adds its force to the working of the engine. You may get some metal that will not be affected by

heat, but that would be too dear. The working matters are a combination of air and steam; if the heat is let in below, carbonic acid will first be formed; if the coal is vigorous in combustion, the engine is stopped by simply turning a cock. I think that an engine constructed on the Barker mill principle, will work and make the cheapest engine possible. I may say that gas has been used in engines which use this combustion principle. The gas fixture was lighted by an electrical spark; but one difficulty was that sometimes the spark would not ignite the gas under the cylinder. Take a spirit lamp in there and it will burn if you allow the valves to be open above and below. If you shut them, it will burn for a minute with a great deal of smoke and then go out. By a mechanical invention, the same movement that stops the engine opens the valves, and the air is allowed to come in contact with the fire. Coal oils are not as cheap as coal. I am satisfied that coal oil used at $8 a gallon, will come cheaper than coal at $5 per ton. Coal oil is a hydro-carbon. One pound of hydrogen will go six times as far as one pound of carbon. In the ordinary caloric engine, I do not think that a temperature of over three hundred deg. is obtained. I think coal oils are of great value, and that they will shortly be used on steamers, the only difficulty being in the practical methods of using them. In the caloric engine, they must have a large friction surface. I wish to say in reference to the Barker mill principle, that the furnace is independent in size and shape of the power which you get. By this system you may make your furnace to hold ten tons if you please.

Mr. Babcock.—The principle of using the products of combustion is 100 years old. The great difficulty is to keep the proper temperature so as not to over-heat the different parts of the engine. The heater is worn out in about six months, but the great economy consists in the decrease of manual labor. Sir George Kaley had tried several experiments in England previous to 1846, but did not succeed because the excessive heat destroyed his packing. A few years ago Mr. Bennett built an engine at a cost of $50,000, it was put on a railway, and after running a few miles it went off the track into the ditch and was sold for old iron. A gentleman has one running in Boston which makes 300 revolutions a minute. We are not to look for any great advantage by using air on Captain Ericsson's principle. The rate of destruction is various: some run out in a few weeks, and others

run for a year and a half. A heater having to be replaced in six months the expense would be small, $25 for an engine. The economy of air over steam due to the engine may not be much, but the saving lies in the little attention required. An Ericsson engine of one horse power will cost $700, while a steam engine of the same power will cost only $200, but the cost of running will be in favor of the Ericsson engine. Mr. Simpson told me that the power which kept his engine running was the different temperature above and below, which was due to the economizer. Ericsson undertook to get 1500 horse power from his engines, and succeeded in getting only 300. One of Wilcox's improvements is that he uses the air hot. Mr. Sterling using a double acting engine uses the air cold, while Wilcox uses two single acting engines. Any one who may wish to see Mr. Wilcox's engine, Mr. Simpson will show it to him in the basement of the Institute.

Mr. Garvey stated that he had studied the mode of economizing caloric sixteen years ago, also, that he had obtained a patent for that purpose, but that as it was connected with a series of patents of the same nature he did not wish to say much on the subject.

Mr. Seely thought Mr. Garvey had given up the idea of using the products of combustion too soon.

Mr. Dibben said that he had made experiments on this subject as far back as 1850. He felt disposed to question the actual facts as presented by Mr. Babcock. He did not believe the Sterling engine ever did what the gentleman said it did. Its only good feature is that it requires very little attention. He had seen an engine called a four horse power worked by a good engineer, which only gave one and a half horse power. Ericsson's engine works on the medium principle. It takes air and compresses it. He tried compressing air at a high temperature and found that he could not obtain as good an engine. Why not super-heat your steam a little? The fatal mistake against the caloric engine begins with the deterioration of its machinery; if it is not that, it is the loss by friction. Steam engineers wont admit that they lose more than two and a half pounds on the piston. I think the loss will be twelve per cent. A two horse engine, with the exception of the fire, requires more attention, or as much at least, as a forty horse power.

Mr. Babcock stated that Mr. Ericsson was using air at the initial pressure of 15 pounds.

Mr. Garvey stated that there was a maximum and a minimum pressure.

Adjourned to Wednesday evening, October 31st, 1860.

American Institute, Polytechnic Association, }
October 31, 1860. }

Prof. Mason in the chair.

The Chairman proposed three questions to be answered by those explaining the engine. First, as to the burning of the heaters; for if they are liable to be burned out frequently, it is an objection to its economical use, not only from the expense, but from the frequent interruptions in the working of the engine. The second, also in the form of an objection, relates to the small amount of force that could be accumulated. The air being heated as it is used, no provision can be made, as in the steam boiler, for a supply of work for a little time. The heating up occurs at the moment, and is liable to disappointment, upon the slightest accident or occasion of delay. The third and strongest objection relates to the small amount of power that is obtained. It is only changing one gas, not into another, but an expansion of the same gas; whereas, in making steam, we expand a liquid instantly to 1700 times its bulk. In air engines double the volume is all that is usually obtained. He would like to hear either some one answer to these objections, or evidence that in spite of these objections, the economy is such as to make the caloric engine valuable.

CALORIC ENGINE.

G. H. Babcock.—Although the science of air is comparatively in its infancy, yet it was not so recent or so unexplored as many might suppose. Down to the present week there have been issued in this country thirty-five patents for air engines and improvements therein. In Great Britain the number is much larger, the official list showing upwards of 200 patents for the same object. All these inventions may be classified in four grand division of classes. Each class may be capable of subdivision. The first class may include those engines in which a reservoir of compressed air is used, similar in its effect to a steam boiler.

Second class are those which use the gaseous products of combustion; it also includes the explosive ones.

Third class. This class would include those engines which

use a certain quantity of air, alternately heated and cooled during the stroke. In this class are the Stirling, Hazletine, and others.

Fourth class includes those engines in which fresh air is taken from the atmosphere at each stroke, expand in the engine, and again discharged. In this class are the Ericsson ship engines, his small engines, and the Wilcox. The fourth class only are now in practical operation.

The Chairman.—Why are not the other classes in practical operation?

Mr. Babcock.—I know of no practical reason why the first and third are not in use. The power lost in the condensation of the air might be one reason why the first are not successful. Of all the experiments that have been made three only have been in successful operation—the Stirling, the Wilcox, and the Ericsson. At the present time the Ericsson and the Wilcox are the only ones I know of in daily operation, which are regularly used and performing useful work.

The Chairman.—How small a power is used?

Mr. Babcock.—It would be easier to tell how large a horse power is used. The Wheeler & Wilson sewing machines require about one-sixtieth part of a horse power. The smallest air engine would drive several of these. The Ericsson engines are running in some cases up to two-horse power. The Ericsson is probably familiar to all present, several hundred of them being in use in various parts of the country. The Wilcox engine being more recent is probably familiar to few. One 18-inch is driving a cracker bakery in Pawtucket, Rhode Island; another smaller one has pumped the water for sprinkling the streets of New London during the past season. A 12-inch engine is now driving a large double medium printing press in Westerly, Rhode Island. Another of the same size has been running in the basement of this building pumping water for supplying the upper stories. Mr. Cooper has consented to have it in operation this evening, so that the association can witness its action after the adjournment.

The Chairman inquired what the cost for fuel per day would be.

Mr. Babcock could not say. He was informed the engine at Pawtucket used sixty pounds of coal during twelve hours. He had prepared drawings and diagrams, showing the construction and operation of this engine. This engine consists, principally, in two upright cylinders. One is the working cylinder, and is

double acting. The other one is used as a supply cylinder, and for transferring the air at the proper time to the heater. This cylinder is double acting. The pistons in these two cylinders are connected to two cranks placed at nearly right angles. The action of the cranks gives the piston a differential movement, approximating that which theory would indicate. The smoothness of motion due to the action of the crank, in practice compensates for the want of theoretical accuracy. Between these two cylinders is another chamber, connecting both at the bottom, and containing the economizer, composed of metal plates so placed as to permit the free passage of the air between them. The economizer is equivalent in construction and effect to the "regenerator" of Stirling and Ericsson. The practical effect of the economizer has been disputed, but experiments with this engine indicate that there is a practical economy in its use. This engine has been found to run at twice the speed, other things being equal, with as without the economizer. It is also found that the effect of the economizer in causing a difference of temperature in the same air, passed repeatedly through it, will cause the engine to run half an hour or more, without taking in a fresh supply of air. Over the economizer is a single rolling valve performing the threefold office of induction, eduction and equilibrium valve. The bottoms of both cylinders and the economizer chamber are used as a heating surface, the fire being so placed that the products of combustion circulate, first, underneath, and then around the sides of the cylinder before reaching the smoke-flue. The heaters are protected from the intense action of the fire at any one point. It has been found in these engines, and also in the Stirling, that a better effect is obtained from the same amount of fuel by this arrangement of flues than when the fire is allowed to act directly upon the heater, while it is evident that the heaters will endure longer in consequence of being exposed to a more equable temperature. If any one part is overheated it will cause, by its expansion, a strain which tends to weaken and destroy the whole. He thought the Wilcox engine heated the air to as high a degree as the Ericsson, with a lower temperature in the heaters, owing to the large extent of the heating surface. To prevent overheating any part while the engine is stationary, Mr. Wilcox has devised a self-acting regulator which closes the damper, or opens a passage way for cold air over the fire in case the heaters are raised above a safe temperature. He then described the

apparatus which consisted in the use of a vessel of mercury so placed as to be vaporized, in case the metal was overheated, and by the expansion of its vapor to act on a diaphragm outside.

In answer to a question of the Chairman; he thought the heaters would last a long time, but had no means of knowing definitely. Stirling's lasted from two to three years, and he saw no reason why the Wilcox heaters should not last as long. Another difficulty heretofore experienced had been the proper lubrication of the different parts. When kept at a proper temperature there is no difficulty. By the circulation of air within the working piston the metallic packing was kept at a sufficiently low temperature. Above the metallic packing Mr. Wilcox places a cotton one, saturated with oil which keeps the cylinder properly lubricated. By the use of the economizer the valve is kept at a temperature not over 300°, and is therefore easily lubricated. In answer to a question by Mr. Churchill, Mr. Babcock stated that the contents of the economizer was about one-fourth that of the working cylinder.

The Chairman inquired what the power of the engine was?

Mr. Babcock never tested the power of the engine by the brake, but had seen an 18-inch engine performing work which he judged to be equivalent to two horse power.

A Member.—Do I understand that an engine of two horse power running a day of twelve hours will consume 60 lbs. of coal per day?

Mr. Babcock.—If we assume the 18-inch engine to be two horse power then this was the fact, which was equivalent to 2½ lbs. of coal per hour for each horse power.

Mr. Schuartz inquired what was the difference of action between this engine and the Ericsson, and spoke highly of the ingenuity displayed in the arrangement and operation of the two pistons within one cylinder in the latter.

Mr. Babcock said he did not wish to detract from the merits of the Ericsson engine, but stated that the peculiar motions required in that arrangement limited the speed to a low figure. By the use of the two cylinders Mr. Wilcox obtained an ease and smoothness of motion which enabled his engine to run at a much higher velocity, and in consequence with an increased power. He also avoided the noise and the destructive effect due to such irregular motion as was necessary in the Ericsson engine. Mr. Babcock then explained by means of diagrams the position of the piston

and cranks at each one-eighth of a revolution, showing the manner in which the air was received, expanded and discharged; and showed by means of another diagram the theoretical pressure at each of these positions.

Mr. Dibben wished to know if that diagram exhibited the practical working pressure?

Mr. Babcock.—These figures are reduced in practice by the lost space and other elements, perhaps from 25 to 30 per cent; that the pressure is slightly above the atmosphere when exhausted is shown by a puff which may be distinctly noticed. The pressure therefore must have been within 30 per cent of these figures to have produced this result.

Mr. Garvey.—Do you take in one volume of air and expand it to two?

Mr. Babcock.—Yes. It requires about 600° to double the volume of air at ordinary temperatures. In practice this is usually attained.

The Chairman.—What name did the economizer go by first?

Mr. Babcock.—Stirling called it a "regenerator," but Mr. Wilcox calls it an economizer, as more properly indicating its office.

The Chairman asked why air was a more economical power than steam, when its expansion was so much less?

Mr. Babcock.—The specific heat of air being about one quarter that of steam or water the same amount of heat produces a greater expansion.

The Chairman asked if this engine was more economical as regards fuel than steam?

Mr. Babcock said that it was more economical than steam engines of the same power. It was perfectly safe.

The Chairman thought that great economy might yet be realized in the working of locomotive engines. He thought that engineers would yet be paid in proportion to the amount of work performed, and the saving of fuel. The Wilcox engine is capable of running light at 200 revolutions per minute. It performs to the best advantage from 100 to 140 revolutions per minute.

Mr. Seeley said that the same heat which would heat water to 100° would heat the same weight of air to 4,000°. One pound of water is 27 cubic inches, expand it to steam, and it occupies 27 cubic feet. One pound of air occupies 13 cubic feet. The same heat which would expand one pound of water to 27 cubic feet would expand one pound of air to 104 cubic feet. He then went

on to explain the composition of coal oils, and argued therefrom that by burning them within the engine a great amount of saving in fuel might be realized.

Mr. Dibben thought that the practical air engineers might have shown better proofs of economy.

The Chairman inquired if the great advantage claimed for the air engine was not due to its safety.

Mr. Dibben did not think so. He failed to understand the difference in action between Mr. Wilcox's engine and the engines of the caloric ship Ericsson.

T. D. Stetson explained one of the great points in which the Wilcox engine differed from those in the Ericsson. In that ship the supply of air was forced in by pumping it through large force pumps against the pressure which obtained within. In the Wilcox engine there is a period while the working piston is descending, when the whole interior of the engine is in free communication with the external atmosphere. During that period the changing piston descends and inhales a full charge of cold air above it, precisely as the air enters an accordeon when it is expanded. That is the way the air is received. It occasions no resistance, because there is no pressure against the under side of the changing piston. The moment it is thus inhaled the induction port closes, and the dense cold air is subsequently transferred by the rising of the changing piston into the hot part of the engine, when, by its expansion the working piston is driven up and power is developed. The rising of the changing piston occasions no resistance, because, while it rises the same pressure obtains on its under as on its upper side, whatever that may be. The two sides are in free communication through the openings in the economizer. As the changing piston rises and compels the air above it to pass down through the economizer into the hot part of the engine, the pressure rises in consequence of the heat received by the air; but it is felt equally on the upper and under side of the changing piston, and is only sensible on the working piston, which latter receives the pressure on the under side. The upper end of the working cylinder is always open to the atmosphere.

The question of most interest, Mr. Stetson believed, was not the difference between this and the variety of air engines, but whether either or any had practically solved the problem presented, and was a really successful and important machine. He

believed that both Ericsson's and Wilcox's engines were fairly entitled to be thus considered. Between five and six hundred of the Ericsson engines, and some twelve or more of the Wilcox engines are now in daily and successful use.

Mr. Roosevelt inquired if the caloric yacht was not lying up—was she a success. He had seen a boat driven by a six horse power caloric engine which could be driven as well by two men with oars.

Mr. Stetson considered the engine successful for stationary purposes. It would do, and was doing, in hundreds of instances, the work for which it was purchased, without involving any expense for attendance, or increasing the rate of insurance. It had failed only where too much had been expected of it. It's too enthusiastic friends—possibly the manufacturers—had rated its power far too high, but there was danger that that fact would induce an overlooking of what it really did successfully perform. The question of the durability of the heaters had been raised by the Chairman, and it was a very important one. The Ericsson engine was obviously less durable than the Wilcox, but he felt no hesitation in saying that even the Ericsson heaters were reasonably durable. Dodge & Grattan were printing at 56 Gold street with an Ericsson engine which had worked from the spring of 1859 to the spring of 1860, and then was replaced by a larger one which had worked without interruption down to the present time. Mr. Stetson could not say positively that the heaters of the first engine were seriously defective when the change was made, but if the heaters of these engines did require a renewal as often as every twelve months, the expense, as guaranteed by the manufacturers, was only $15—a mere trifle compared with the salary of a competent engineer.

The Chairman said that there was no light thrown on the side of economy of fuel this evening.

Mr. Stetson said that in steam engineering an engine of 200 or 300 horse power worked much more economically than one of two or three. The air engines were not more economical of fuel than large steam engines, but were much more so than the small steam engines for which they were substitutes. The present engine at Dodge & Grattans—a 24-inch cylinder—required but one hundred pounds of anthracite per day. He had not tested its power, and declined to attach any importance to the "five horse power" which had injudiciously been claimed for air

engines of that size. The first engine at Dodge & Grattans, Mr. Stetson had carefully tested by a friction brake, under favorable conditions. It was an 18-inch cylinder, and produced an effect equivalent to lifting 21,000 pounds one foot high in a minute, which was about two-thirds of a standard horse power. This it performed continuously and steadily, when properly fired.

Mr. Roosevelt stated that he could stop any Caloric engine when in motion by placing an axe upon the wheel.

Mr. Fisher said that the safety of the Caloric engine ought not to be brought up as an argument in its favor, as against the low pressure steam engine. There were a few years ago boilers in use in England which had been in operation at very low and safe pressure for 60 years, and which seemed likely to remain in operation for 60 years longer.

Mr. Bartlett said it was evident that steam engines had done their work well. He thought Ericsson's fame and success lay in the fact that he had supplied engines for small powers which was a great desideratum.

The Chairman stated that he was authorized to inform the association, by the persons who were making experiments on the New Jersey Central railroad, that they had one of the three sister engines, with which they were experimenting, running with 54 cars instead of the usual number (45) for six or eight successive days on a wet rail, without the use of the sand box.

He then announced that the subject for discussion on Thursday, the 8th of November, would be the "Preservation of wood," and, in connection with that subject, he said that the replacing of the wood work exposed to air on the Hudson River railroad was once in seven years.

Adjourned until Thursday evening, November 8, 1860. Subject for discussion,—"Preservation of wood."

After the adjournment the association retired to the basement of the Cooper Institute, for the purpose of witnessing one of Wilcox's air engines in operation. During its operation Mr. Roosevelt completely stopped it by placing his hands upon the wheel.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
November 8, 1860.

Mr. John Johnson in the chair.

Mr. G. H. Babcock, in answer to some questions which were put to him at the previous meeting in regard to the relative economy of air and steam, submitted the following as the result of his calculations:

The combustion of one pound of coal will heat 60 lbs. of water from 32 deg. to 212 deg.=180 deg.

The specific heat of air being quarter that of water, one lb. of coal will heat 240 lbs. of air 180 deg., or 84 lbs. 508 deg., which is sufficient to double its pressure, the initial temperature being 60 deg. F.

84 lbs. of air = 1,102 cubic feet at 15 lbs. pressure, or 110 cubic feet at 150 lbs., one pound of coal will then produce 110 cubic feet expansion of air, varying from 300 lbs., to 150 lbs. pressure = 208 lbs. average, 110 cubic feet = 17,280 square inches, +11 feet.

17,280+(208-150)+11=11,024,640 feet, lbs=the mechanical effect of one pound of coal applied to heat air at 150 lbs.

Deducting 50 per cent. loss in furnace—steam boilers average about 35 per cent.—we have left 5,512,320 ft. pounds.

Add 50 per cent. gain by use of economizer, and we have 8,268,480 ft. pounds.

Allowing 50 per cent. of this to be lost in the engine by friction, lost space, &c., and we shall have a practical effect of 4,134,240 foot pounds from one pound of coal, which is equal to 48 pounds of coal per hour per horse power.

Utmost capacity of the Cornish engine, 1.48 lbs. per hour per horse power.

Common duty of Cornish engine, 1.98 lbs. per hour per horse power.

Average duty of Cornish engine, 2.64 lbs. per hour per horse power.

Average duty best Marine engine, 4.4 lbs. per hour per horse power.

A high pressure air engine properly constructed, should, therefore, run for 25 per cent. of the fuel used in the best Cornish engine, or 11 per cent. of that used in the best Marine engines.

Mr. Seely.—Has the regenerator and economizer been left out in any of these Wilcox engines?

Mr. Babcock.—Wilcox took out the economizer and reduced the lost space to the smallest amount. By using the economizer, the heat is sufficient to expand the air.

Mr. Garvey inquired of Mr. Babcock what his authority was for stating the specific heat of the air to be one-fourth that of steam? If the proper data were taken, it would be found that the caloric engine was far less economical than the steam engine in theory as well as in practice.

Mr. Babcock said he could not give the name. One gave the specific heat of air compared with water, to be 36-100; another set it down as 22-100.

Mr. Garvey.—The caloric engine was ably handled by Barnard, in Silliman's Journal, but the analysis did not show such advantages in favor of the caloric engine as Mr. Babcock deduced.

Mr. Babcock.—All the power that is lost in the compression of the air is made up for in the stuffing of the engines.

Mr. Dibben thought the caloric engine effected a saving only in fuel; after that, he did not see its benefit. The great problem to be solved now is to cast the cylinder bottoms thin. It is found that the thicker the cylinder bottom is the more liable it is to crack.

Mr. Rowell stated that the best work of the Cornish engine was, for three lbs. of coal, one horse power. He said the last number of the Cornish engine gave 60,000,000 lbs. foot power per bushel of coal of 94 lbs.

Mr. Seely said it seemed strange to him that Mr. Ericsson should desert his engine. Mr. Babcock says that Mr. Wilcox has taken out his regenerator and it was found that it would scarcely move. It is known to have been taken out in other engines, and they have worked well without it. Heat has four times the effect on air than it has on water. Let them put the friction brake on their engine of a cold morning, and they will find a result similar to the one found in the Cornish engine. He thought an actual trial would be better than speculation.

Mr. Babcock stated that an 18-inch Ericsson engine without the economizer, would not run light over 60 revolutions per minute. He had seen the Wilcox engine run with the economizer over 200 revolutions per minute.

Mr. Fisher thought that before going to trial, their plans ought to be discussed. He stated that the first idea of a regenerator was the respirator for persons having delicate lungs; the next

was Stirling's. Mr. Cowper has one in England which heats the blast to 1,300 deg. It had occurred to him that one of Cowper's regenerators might be used advantageously on the caloric engine.

Mr. Koch stated that one pound of coal would give about ten per cent as applied to the best of coal engines. (?)

Mr. Babcock said that after making all his deductions for friction and loss by expansion, etc., he had found that there was a saving in favor of the air engine of 25 per cent. One properly constructed using air at high pressure of not less than 10 atmospheres, ought to give this result. He proposed to use compressed air, and not to be obliged to compress the air at each stroke.

Mr. Koch said they had no mechanical means of getting so great a degree of compression.

Mr. Babcock stated that in all his calculations he had allowed 50 per cent for loss in the furnace, and 50 by friction. (?)

Mr. Bruce read a paper, stating that he had seen in the World of November 5, a cut representing Hoe's ten cylinder press, and read a portion of a very elaborate article upon the history of printing. He (Mr. Bruce,) claimed that Mr. Hoe's press was but an improvement of a cracker machine which he had invented as early as 1826.

Mr. Babcock said Mr. Hoe was not the first man to use a press with type on the cylinder.

Mr. Barnes said that one with the type on the rolling cylinder was invented before the close of the last century.

PRESERVATION OF WOOD.

Mr. Bruce said it was stated at the Farmer's Club that immersing wood in sulphuric acid would preserve it. It was also stated at those meetings that wood so immersed had been preserved for 12 years.

Mr. Dibben said he occupied premises where they were manufacturing soda water. Small quantities of the acid used to fall on the floor and his benches, and wherever they were touched by it they were completely destroyed, and the ceiling fell out altogether. One of his tool handles also got saturated with it, and it shared the same fate as the ceiling. From these facts it was clear to his mind that it was deleterious.

Mr. Veeder wished gentlemen to state how far creosote could be used for the preservation of wood. In Ohio, on the railroad, midway between Pittsburg and Cleveland, there is a coal yard where they can produce 500 gallons per day of crude coal oil.

This oil, which could be procured for five cents a gallon, he thought could be used advantageously. When using timber he has his poles cut and put into a pond of water in spring; about fall they begin to sink, and by the time that winter sets in they have all sunk. He then piles it up until properly seasoned, and afterwards plants them upper end down, the butt being uppermost. Wood so used has lasted for fourteen years. He thought that the timber now coming from the West was not so durable as it used to be.

Mr. Koch.—Trees when cut retain their sap; getting rid of this sap is the best mode that could be adopted for its preservation.

Mr. Seely thought it unfortunate that the president was not present at the meeting, as he could tell how soon railroad wood would wear out. Wood is precisely the same as cotton in composition. When you put it into a gun it comes out cotton in composition. The useful part of wood is not changeable. It is the sap which creates a fermentation that destroys the wood. Get shut of this sap and you preserve the wood. The matter which causes the fermentation is like the white of an egg. Albumen is easily decomposed. Take a piece of mint and how do you preserve it? We dry it. Varnish up wood so that the water will not get in, and you will preserve it. Roast eggs or meat and you preserve them, as you coagulate the album. Put a ham over a fire of chips—the chips producing creosote, and you preserve it. The same rule applies to wood.

A member inquired whether it preserved the wood wet or dry.

Mr. Seely said either way, so that the smoke got into the wood. Saturate wood with sulphate of soda, and it will answer well as a preservative; but the expense is a fatal objection to its use. When the fact becomes known that creosote can be purchased for eight cents a gallon—creosote mixed with coal tar is better, as the tar on the outside makes a varnish through which water cannot penetrate—wood can be preserved for twice the length of time.

Mr. Johnson stated that he had applied creosote to planks, and also to railroad ties; he had certificates which went to show the superiority of it over anything yet tried. The proper course would be to subject them to the product of combustion, and then immerse the wood in a tank containing a mixture of carbonic acid and creosote oil. In England sulphate

of copper and creosote are the only things used. Soft cheap wood would absorb about eight pounds of creosote to the cubic foot. It should receive from eight to ten pounds to produce the desired effect; this would cost about one cent per cubic foot. Applying it hot would be better. The wood could be put through this process in about ten days.

Mr. Garbanati said that from Mr. Johnson's statement they would shortly have no timber, Mr. Mason having stated that timber only lasted seven years. The Royal George had been raised after having been sunk for a long time, with her wood quite hard and in a good state of preservation. He did not think that the ties of railways would have to be relaid as often as Mr. Mason said would be required. There has been instances where timber exposed to air had lasted 100 years. The buildings that tumble down are those put up by ourselves, while the houses put up by our forefathers still remain or have to be pulled down.

Mr. Dibben said that Mr. Mason did not allude to houses when he stated his opinions, he alluded to bridges. He (Mr. D.) did not think that keeping water out of wood would totally preserve it. New Jersey contains a very bad soil for timber posts—the same posts planted in it would last longer in a swamp. An acquaintance of his who had occasion to put up a piece of fence very often was advised to try coal-tar. He did so, and the last time he put it up he put in every second post steeped in coal-tar, and the remaining ones without it. This was ten years ago, and the ones he steeped are now as good as ever, while the others had to be replaced. An old tree in St. John's Park, twenty-five feet six inches in diameter, was blown down, the butt of which is nearly all decayed, while on the top there was a branch growing, in the centre of which a portion of it was decayed.

Mr. Hedrick could not see any good effect to be derived from the use of sulphuric acid; the first effect of it on wood is to char it and leave us charcoal, the next stage is to reduce it to a composition like sugar.

Mr. Hough stated that nature performed her part towards preserving timber for us; as she draws the sap from it in winter, returning it again in spring.

Mr. Garvey said there were four plans of preserving wood which could be used with advantage. The first was, to hermetically seal up the wood. This could be accomplished by using paints, varnish, &c. Second, was by producing all the chemical

changes the wood admits of at ordinary temperature before it is used. Any organic matter that is subjected to a low temperature for a while will have the equilibrium of its affinities disturbed. This is effectually accomplished in a plan devised by him, viz: By distilling the wood until all the changes in the chemical constitution of the wood, are brought about, which occur at ordinary temperatures. This result is partially attained by kiln-drying it in a heat of 180°, as is done with wood used in the manufacture of pianos, melodeons, &c. The third process is by using chemical reagents to act upon the more unstable organic compounds and convert them into more stable substances. The fourth process is by partially fossilizing the wood—filling the pores with some inorganic matter, and leaving it in a mineral state in the pores of the wood. In building he found it necessary to use wood that had been exposed to every vicissitude of temperature, during at least one season after being squared. The principal object to be obtained is to keep out the water. Fossilizing, kyanising, &c., were so expensive that they had to be abandoned. The most economical plan is to steep wood well in running water to wash out the sap, and then to pile it up so that the air could pass freely through it, and the heat of the sun and weather may act upon it.

Mr. Veeder did not think coal tar was a preservative for wood. He stated that he had his house shingled in 1840 with perfectly dried shingles, and they are perfectly sound now. Sometime later he built an addition to his house, and when shingling it he had a man to cover them with coal tar; those shingles are now rotten and will have to be removed. There are on his ground several stumps of trees, the history of the cutting down which has passed away. The ground where they now stand was formerly wet ground.

Chairman.—What kind of wood is it?

Mr. Veeder.—Yellow pine. In planting posts he was in favor of using a covering of asphalte, but should be laid on when the timber is perfectly seasoned.

Mr. Seely said that Mr. Hedrick was right when he said that if we remove the odor we remove creosote; coal tar is offensive to every one. What we mean by creosote here is that portion of the coal tar which contains the most creosote. Coal tar has a remarkable penetrating power. Take two pieces of timber,

and lay a coat of copal varnish on one, and a coat of coal tar on the other, the coal tar will penetrate the farthest.

The Chairman said he saw it stated in a paper that in England 5,000 acres of timber was used yearly for sleepers and other purposes on railways.

Mr. Koch said it was universally conceded that the greatest loss was occasioned by the sap. Extracting the sap, and concentrating the fibres of the wood, he thought was the cheapest and most simple process that existed. He had been in the interior of California a good deal and found a great many trees standing without any bark, perfectly seasoned, and to all appearance they would last two or three generations longer. It was found nearly impossible to cut them down. Palm wood will last nearly 150 years.

Adjourned to Thursday evening, Nov. 15, 1860, at 7½ o'clock.

American Institute, Polytechnic Association,
November 15, 1860.

Professor Mason in the chair.

PRESERVATION OF WOOD.

The Chairman inquired how long the sap was injurious to wood. He stated that it had been ascertained that trees have lived from 5 to 700 years. It was stated that there are trees now standing on Mount Lebanon which were there in the time of Solomon. Trees are only useful after they are cut down, not having given any return during their lifetime. What relation has the pith of the tree every where diffused through the wood from the centre—what relation has this to the preservation of the heart wood of the tree? Men and trees are nearly alike in their construction—so much so that the sinews of a man resemble the heart wood of a piece of hickory. The same agent which nature sets to work to make them is set to work after vitality ceases to pull them asunder. The first thing to be done towards preserving wood is to keep out that destructive agent oxygen, and to drive out what oxygen first takes hold of to commence its work of destruction. A favorite pupil of the Chairman has become a railroad president, and this was the man who invited him to bring this subject before the meeting for the purpose of discussing the best mode of preserving bridges and railroad ties. This young man has reduced the cost of running an engine on that road from 89 to 59 cents per mile.

Mr. Fisher.—Physiologists have stated that we are dying every minute—living and dying at the same time. He thought this might apply to trees.

Dr. Stevens, in reference to the Canada railroad, said the proprietors of it failed on account of the wood they used. It was not firm enough in its fibre to sustain the load. Their experiments were entirely confined to the sulphates of copper and iron. Saturating wood with these would answer very well as far as the wood was concerned, but it would be very injurious to the iron. The large trees of California have been very much misrepresented in regard to their age. Dr. Torrey has examined some trees which he found to be 2000 years old. The sap of the tree is simply the material for forming the wood. Red cedar is the most endurable of all timber, and there are some buried in the United States which have existed since the time of Adam. They are taken from a depth of 100 feet below the surface of the earth, and are not petrified. The coast of Jersey, like its politics, is in a state of vacillation. Large forests have been buried in the lands along the Jersey coast which has subsided, and a large proportion of our white cedar is brought from these swamps. Oxygen is necessary for the combustion of wood. In Canada there is no bitumination or charring of wood at all practiced. The first sleepers of the Utica and Schenectady railroad were laid of this swamp wood.

Mr. Stetson inquired how the durability of this buried wood compared with fresh cut wood?

Mr. Stevens said it was stated that a red cedar was never known to rot. Kreosote and carbonic acid is one of the best conservators of wood, and it can be furnished at five cents a gallon.

The Chairman.—Which of the woods—the hard or the soft—will furnish the greatest amount of pyroligneous acid?

Mr. Stevens said a relative of his carried on a distillery for the manufacture of this acid, and he (Mr. Stevens) had the means of becoming acquainted with it. It was found that birch wood made the most of this acid. Some say that birch has no sap, while others contend that it is nearly all sap.

Chairman.—How about maple?

Mr. Stevens.—At certain seasons of the year it makes a great deal. Hickory also does the same.

Chairman,—Will some gentleman give an account of what is driven out of wood?

Mr. Seely said he went into that matter last week, but did not give his conclusions on the subject.

Chairman.—Will some gentleman tell us how salt preserves meat, and if it would preserve wood in the same manner.

Mr. Koch said there was a cave in Bremen, called the "Lead Cave," which possessed the peculiar property of preserving bodies of every kind to a wonderful extent, keeping the flesh quite hard. It had an arsenical atmosphere, which he thought was the cause of it. In preserving timber, he would first put the trees in the water, and leave them there until they would sink; after that he would apply an arsenious mixture to them.

Chairman.—The albumen that is found in cells of wood that has not been converted into hydrogen, is it not capable, by some mechanical operation, of preventing it from being injurious to the wood? Dry rot is to be apprehended if you close up the pores of the wood.

Mr. Garvey.—You should distill wood till you bring about all the changes that it is liable to by the application of moderate heat, &c. If you reduce the temperature of wood, bringing it to freezing point, it will not decay. In my experience in building I have found it necessary to have the scantling of wood of a proper size, so as to prevent springing, &c. Sap is the most unstable of the organic matters existing in wood. Water is very useful in removing sap and gum from wood. I have also used alcohol and strong ley to advantage in my method of making artificial boxwood, for removing all soluble matters. Fossilization is sure to make wood last for a long time. I think that the introduction of arsenic into timber used for building purposes would be very deleterious to the public health, and at the same time would be so very expensive that it could not be employed.

Mr. Dibben.—Mr. Stevens, eight or ten years ago, made a series of experiments on the Amboy Road. He used corrosive sublimate. Creosote and coal tar were also used, but the cost was found to be greater than the gain. Late reports state that some of the timber used on English railways has been taken up, after having been laid for three years, and it was found to be harder than when it was put down, the coating that was applied to it before it was laid having formed a coat which effectually preserved it. One of the results of those experiments can be found in the Franklin Institute Journal. Nothing else but car-

bonic acid, or creosote, has been found to be of the least service in preserving wood. It costs seven cents per cubic foot for preserving wood, and there being three cubic feet of timber in each sleeper, the cost for labor, along with the expense of creosoting, will amount to twenty-one cents.

The Chairman said it would cost fifty cents to replace each sleeper. Anything that will give a permanency of three times the length of time they exist now will create a saving which will be incalculable.

Mr. Veeder said that if the locust tree could be made to grow in the West, where there was such a fertile soil and a great number of railways, it would be of great economic value to railway companies. Chestnut wood, although porous, was better than any other, except cedar and locust.

The Chairman said that hickory wood was the hardest there was, but that it decayed the most rapidly.

Mr. Stevens stated that the specific gravity of the oak was greater than any other. Air can be forced through the chesnut by the human lung.

The Chairman.—If you cut the cell walls of the tree you will find them very compact.

Mr. Stevens said, in answer to a question of Mr. Seely, that some living trees commence to decay from the center, and others from the outer surface. The pith is disseminated all through the tree.

The Chairman.—Have you observed that it is more minutely disseminated through the white oak than any other?

Mr. Stevens.—In some cases it is microscopical. In Wayne county there was a tree found lately, which, on examination of some blaze marks found in the wood, with several annual rings of wood over them, proved that it was in existence at the time the Spaniards landed in Texas.

The Chairman inquired whether there was a greater tendency to decay in trees that were poorly supplied with pith, in comparison with those which were well supplied. A tree of button wood was in existence near the salt mines, the circumference of which was nearly 30 feet, while only about three inches of the shell remained.

Mr. Johnson said he had certificates extending back 20 years in favor of creosoting. Timber thus used loses some of its flexibility; it hardens wood, and prevents abrasion in soft wood.

Bitumen is largely used in the preservation of iron. He thought the effect of using bitumen at a temperature of from 300 deg. to 350 deg. would be better than applying it cold. From the unqualified endorsement of the creosoting material over all others by the most eminent engineers and chemists in England and Scotland, where it has been largely used in dock, bridge, railroad and many other kinds of timber, with no known case of failure, he was inclined to give it the preference, and has been applying it to plank for Mr. Lane, Engineer of the Brooklyn Water Works. He could supply the carbonic acid and oil combined at seven cents per gallon. The process of application he stated was as follows:

1st. Prepare a strong iron cylinder and place the wood in it, exhaust the air by an air pump until a vacuum is created equal to about 12 lbs. to the square inch, the cylinder is then filled with creosote under pressure of about 150 lbs. to the square inch; the timber is then removed fit for use.

Second process is by placing the timber in a drying house, and passing the products of combustion through it, thereby not only drying the wood but also impregnating it with the volatile oil and creosote contained in the fuel used to heat the house. The wood is then placed in a tank containing hot creosote, remaining until thoroughly impregnated.

The Chairman inquired if there was any likelihood of procuring creosote at a less price than 7 cents a gallon?

Mr. Johnson said it was more likely to be higher. The mode of obtaining creosote is by obtaining it from coal tar. Crude coal oil is worth about 30 cents a gallon.

Mr. Veeder stated that in the manufacture of coke all the products had been used up except the coke itself.

Mr. Garvey said that the object of lighting chips around wood was to produce creosote and pyroligneous acid. In manufacturing coke all that was necessary was to drive off the light volatile matter. If you continue the driving off of the volatile matter you leave nothing but carbon. Soft coke is the best for generating steam, and is coke not entirely deprived of volatile matter.

Mr. Stetson said that the mere steaming of wood seemed to destroy its life—its character; also, that mere mechanical pressure was a great means of changing the character of timber.

Mr. Johnson presented specimens of timber, one from Stuart's

of Duane street, which had been taken from the wall in a rotten state. The probable time of its being in use was 30 years.

The Chairman.—If creosote can be furnished at 5, 6 or 7 cents a gallon at the place where it is to be used it would cause a great saving. The expense of repairing railroads is enormous. I am of the opinion that some gentlemen present will live to see the freight traffic of this country ten times what it is at present. I have lately visited my native home after an absence of forty years, and found it completely changed, the amount of hay taken from an acre being twice what it was, and everything else in like proportion, and on inquiring into the cause of it was given to understand that it was from the fact of their having read the reports of such meetings as theirs was.

The meeting adjourned until Thursday evening, November 22, 1860, at 7½ o'clock.

Subject.—The "Sewing machine."

American Institute, Polytechnic Association,
November 22, 1860.

Professor Mason in the chair.

James Holland presented a sample of crockery ware which was intended to be placed on the butts of posts for the purpose of preserving them from moisture. He said he had come to New York with an entirely new invention in science and art. This article consists of a stone post but made to all sizes to suit different sized posts. The cost of those for a three by four inch hole two feet long would be 23 cents. It is supposed that wood covered with coal tar above the part that is enclosed in the crockery will last forever. In planting poles you should let the crockery come about an inch above the surface, so that the moisture could not get into the wood. This article is made of fire clay and sand. Any kind of Pottery clay will make them. We dry them until they are perfectly dry, and then bake them in a kiln for about two days. After baking them they will be as hard as the Mundank stone. It is a well known fact that you cannot get water through pitch.

Chairman.—What is to prevent the water from passing between the wood and the pitch and rotting the wood at this place?

Mr. Holland.—Water will not pass through pitch, but if you plant the poles without the crockery the pitch will peel off, while

if you plant them with this crockery the water cannot get through.

Mr. Garvey said, if the pitch was not thick enough it would peel off from the wood. He did not think the gentleman intended to say that the wood would last without painting.

Mr. Johnson.—The greatest difficulty consists in the checking of the wood.

Chairman (to Mr. Holland).—Have you put one of those out for a winter, and exposed it to the weather?

Mr. Holland.—Yes sir, I have.

Mr. Dibben.—What kind of wood did you use?

Mr. Holland.—Poplar.

Mr. Garvey suggested to Mr. Holland that he should leave a couple of pieces of his pottery for the members to experiment upon.

Mr. Holland said he would furnish them.

Mr. Dibben.—What kind of wood is generally used in telegraph poles?

Mr. Holland.—About our place they use poplar. In Delaware they use chestnut, and on the Camden & Amboy railroad they use pine.

The Chairman said his experience was that no one gained gold by finding it. He was sure that there was more science in the world now than in Job's time. He stated that he held in his hand a piece of gold that was gathered in North Carolina; also, that an amount of gold equal to 94 cents was gathered from the tailings of a bushel of gold, by a particular machine, which would be soon presented. By the labor of two men with one of these machines a gain of about $25 per day would be effected. It is done by the aid of mercury.

Mr. Babcock.—How much of that $25 a day is to be deducted for mercury?

The Chairman said that this amount of gain was obtained over all expense.

A member stated that a friend of his had a machine by which a greater saving could be effected without the use of any mercury.

Mr. Johnson referred to the Wykoff machine.

A visitor inquired if the gold was subject to disintegration by the operation of a mechanical application?

Mr. Dibben said that that was so. He thought that a careful man would take care of his tailings.

The Chairman.—All the tailings of North Carolina can be purchased for a nominal sum.

SEWING MACHINES.

Mr. Babcock said the practicability of sewing seams 20 years ago, by the use of machines, was considered impossible. He thought that although they would cause a reduction in the price of clothing, in the end they would cause an advance in the price of labor. The sewing machine was not the offspring of one inventive mind, but of a number.

Mr. Johnson wished to know if they could not get at the mechanical bearing and early history of the sewing machine. He was told that the change stitch was used on German cloths a number of years ago.

Mr. Dibben admitted that the stitch was to be found on cloths a great number of years ago. He thought that the same amount of work could be done by ancient machines that is done at present by modern ones, with the exception of the lock stitch, of which Mr. Howe had gained the credit of being the first inventor. He (Mr. Howe) held his invention for a considerable time without making use of it. About 1850, other parties commenced to see if they could not improve on Mr. Howe's machine. Mr. Singer began with a few machines in the Bowery, and ninety-nine out of every hundred tailors laughed at the idea of using them. About the same time Mr. Wilson commenced with others. Mr. Grover, of Boston, also commenced about the same time. After the exhibition of a number of sewing machines at one of their fairs, the question arose as to "how we should get sewing machines?" In England they fiercely contested Mr. Howe's sewing machine, but he finally triumphed, notwithstanding the obstinacy of that nation. There is no machine in existence that is not amenable to Mr. Howe's patent.

Chairman.—Who is the next inventor, that has established his invention as important in its results?

Mr. Dibben.—The next practical man to whom the people owe a debt of gratitude, is Mr. Wilson, then Grover, and next Singer.

Mr. Wood.—The rotary hook and feed improvement is the next important improvement. Howe's invention consisted in the formation of a seam by a needle, shuttle and two threads. The needle acted horizontally, and the cloth being suspended on the baster plate, the needle passed through the cloth, and the shuttle passing through at the other side interlocked. The feed appara-

tus consisted of a rack with pins, and at each stitch the cloth moved along. The next improvement was in putting the cloth on a table and feeding it by an endless feed. After that the intermittent feed was used. The feed consists of a feed bar with a tongue in it. Another kind of feed is called the reciprocating or four motion feed. Wilson's first invention was only a double feed by moving it backwards and forwards.

The Chairman said it always occurred to him that Mr. Wilson owed his feed invention to a boy in Rhode Island.

Mr. Wood.—With Howe's invention a shuttle was used to form the lock stitch. This shuttle, two inches long, loaded with thread, must be moved forward two inches, then back and forward again. Started 1200 times and stopped 1200 times. His next invention was the shuttle that moved in a circle. In Howe's the needle descended through the cloth taking the thread with it. The improvement consists in this: that instead of a reciprocating motion a rotary one is attained. This stitch requires three yards of thread to make a yard of seam. This machine is driven by fetters under the table. The reciprocating action of the shuttle is to throw the seam a little zig zag. With the rotary machine the contrary is attained.

Chairman.—Which of these is better for heavy cloth?

Mr. Wood.—Wheeler & Wilson's.

Chairman.—Are any of these used on leather?

Mr. Wood.—Yes. The stitch made before Mr. Howe's was the ordinary tambour stitch. (Mr. Wood here presented a piece of board which illustrated the different kind of stitches.) Howe's consists of two threads, one upper and the other interlocked in the center. Grover & Baker's machine was patented about 1851. He (Mr. Wood) presented a piece of embroidery done by a machine in France.

Chairman. — What inventions are embraced in the sewing machines in use?

Mr. Wood.—A. B. Howe's is the best for heavy work. Binding gauges, hemming gauges, and markers have been added to them and patented. In Wilson's machine, the continued action of the machine on the bobbing holds it sufficiently taut. The tension on the thread is obtained by a pulley. Gibbs has a machine which makes the single thread loop stitch, the double stitch, and the interlocked stitch. Walter Hunt is not entitled to the least credit in inventing sewing machines.

Mr. Haskell.—The stitch of Grover & Baker's sewing machine is claimed as an elastic one over all others. It is done by a circular needle and a vertical one. It has a three-fourth revolution.

Mr. Wood.—I cannot tell how many different patents are embraced in the Wilson sewing machines, nor do I know how many are embraced in Singer's machine. He (Mr. Wood), presented a book which he said contained a history of patents in general.

Mr. Haskell produced one of Grover & Baker's sewing machines, and said: The most important improvement is the circular needle in combination with the vertical needle. The vertical needle makes a loop and the circular one passes through it. It has a three-fourth revolution. It produces a loop and leaves a loop in the centre. The next improvement is the feed, and after that the tension. The slack is taken up by a very ingenious motion here in front. The stitch is loosened and tightened alternately as it is required.

Mr. Orr.—This machine will make about 1500 stitches a minute. It makes six stitches to one revolution of the driving wheel. All the attention that is required in the shuttle machines is dispensed with in this. It is nearly impossible to do bad work by this machine. If a stitch breaks in any seam made by the Grover & Baker machine it will not rip.

The Chairman.—How many yards of thread will it take to make a yard of seam?

Mr. Orr.—About four and a half above, and three and a halt below, making seven and three-quarters altogether.

Adjourned to Thursday evening next, December 3, 1860, at 7½ o'clock, P. M. Subject, "Sewing Machines."

American Institute, Polytechnic Association, }
December 13, 1860. }

Professor Mason in the chair.

The Chairman, at the opening of the meeting, requested gentlemen who wished to propose subjects for future discussion to propose now. He (the Chairman), proposed as a subject, "The best economy of motive power for farm buildings, small manufactories and sewing machines."

Mr. Johnson proposed the subject of "Pottery."

Mr. Haskell proposed the subject of "drawing from pictures."

The above subjects were all adopted.

The Chairman, in reference to the subject of the last meeting, the sewing machine, said they were not to inquire into the ingenuity of the parties connected with the sewing machines. He hoped the social bearing, the operation, and the benefit it conferred upon the public would be inquired into, and discussed as fully as the importance of the subject demanded.

The sewing machine has converted the sewing women into a class of educated laborers. The best needle women are now making good pay by doing work that the machines cannot do. Whatever some people might say in regard to this subject, it has proved a great benefit to women by rendering their employment comparatively healthful, instead of shortening life as constant hand sewing does. A gentleman of this city, who keeps a store in this city for the purpose of selling sewing machines, has set apart a room for the purpose of instructing women in the mode of operating them. Another point of great importance is that, while this machine changes the whole course of things as to sewing, it does not change the general work, leaving the whole field of housework in full operation. A most painful event in the life of factory boys and girls is, that they never lay up anything for the purpose of setting themselves up in life in case of their marriage. On the one hand it is conceded that the occupation of the sewing machine is a healthful one, for the reason that it occupies the feet as well as the hands, and calls in all the best arrangements for healthful occupation. Three-fifths of the work which is done in the community is done on the sewing machine, giving 300,000 hands employment on the sewing machines, equal to the work of 150,000 by hand. He (Mr. Mason) took occasion to call the attention of a gentleman to the fact that the want of a good economical gas burner was a loss of $1,000 a day to the city, but was answered by him that it was not of much importance.

Mr. Stetson stated that the subject of the single thread sewing machine was dropped without the advocacy that it required. He was in favor of the Wilcox & Gibbs' sewing machine. There was a very wide spread impression that the single thread sewing machine was impracticable because the work done by them was liable to rip out, but this, he thought, in some instances, was an advantage. The Wilcox & Gibbs' sewing machine makes a twisted loop stich.

The Chairman.—Does this machine require Mr. Howe's invention.

Mr. Stetson.—No, it does not. In nearly every machine the stitch is formed by putting the shuttle through while the thread is on a slack. He hoped to see the day, in his time, when the sewing machines would be as plenty and as cheap as the clock that ornaments our mantel pieces. (Mr. Stetson here produced a sewing machine, and illustrated on it the manner in which the different motions were accomplished; also, a diagram showing the different positions in which the thread was placed during the formation of the stitch). In this machine the only point to be attended to is the tension. It requires a good deal of discrimination to ascertain how the different lock stiches are formed. The machine can be run with perfect success whether the thread be tight or loose. The Wilcox & Gibbs' machine runs with a greater speed than any other. In one street in this city there are 100 machines running at 1500 revolutions a minute, making 36 miles of seam per day. The Wheeler & Wilson machine runs to the best advantage at between 400 and 800 revolutions per minute, but could be worked at 1500 revolutions per minute. One revolution occupying the twenty-fifth part of a second makes one entire stitch. One peculiarity in the single thread sewing machine is that the needle is so formed that it cannot enter the work wrong. In this machine there is a brake fitted on the driving wheel so as to prevent its working back.

Mr. Lansey.—The first sewing machine I saw was twelve feet long. I have been in the business of furnishing gentlemen's goods generally. The first one that appeared to my mind as the most practical for that kind of light work was the Wheeler & Wilson sewing machine. I used it for years, but had to suspend the use of it as it made a bias stitch. The next practicable one to my mind was the Grover & Baker. With the shuttle stitch the compression is only half what it is in the others. In the Grover & Baker machine the loop not only passes through the cloth but around it, causing compression. Compression, I think, is a benefit. No sewing machine work will ever be equal to that done by hand. In the Grover & Baker machine, I have found by experiment on a piece of cloth a certain length, that it stretched 1¼ inches during the process of stitching. By experiment with the shuttle stitch on a piece the same length as the piece I used on the Grover & Baker machine, I found that it stretched half an inch. He (Mr. Lansey) then produced three pieces of cloth which were cut the same length for the purpose of stitching, and

showed the elasticity occasioned by the different modes of sewing, namely: Hand stitching, Grover & Baker's, and the shuttle stitch. The shuttle stitch is the most economical. The best sewing done, whether by hand or by machine, uses the largest quantity of thread. In a manufacturing establishment, (the proprietor of which I am well acquainted with,) where they use cotton yarn instead of thread, a saving of $2500 is effected per annum.

Mr. Bartlett.—Do you consider that each machine produces a perfect stitch of its kind?

Mr. Lansey.—Yes, sir. I think that for a certain class of work the shuttle stitch is the most economical, but not for family use. The additional quantity of thread used in the Grover & Baker machine over the shuttle is about one-fifth. The shuttle stitch requires to be fastened at the end.

The Chairman.—When you were in business which of those sewing machines did you prefer for shirt making?

Mr. Lansey.—I used the Wheeler and Wilson one for four years.

Mr. Dibben.—The needle in the best machines is imperfect. In stiff or starchy goods, the needle cuts the cloth in such a manner as to be greatly injurious. Notwithstanding the fact that manufacturers get large prices for needles, they are still imperfect. They are sold for fifty cents a dozen.

Mr. Babcock said, in relation to the hygienic effect of the sewing machine, that if the amount of power was taken into consideration it would be found that the Wheeler and Wilson machine required the least. To drive a machine at the rate of six hundred stitches a minute, the sixtieth part of a horse power is required. This may seem small, but it is equivalent to a weight of 500 lbs. falling a foot a minute. Sewing machines are detrimental to the health of the operators. An air engine with sufficient power to drive a sewing machine, would be too expensive. Electricity is not to be relied on. Springs have been suggested, but to have a spring of sufficient weight to drive a sewing machine five hours, would require 15 cwt. of steel. A man exerting all his power could drive probably ten or twelve machines.

Mr. Hithcock stated that Mr. Ericsson had invented a plan to drive machines by the use of compressed air.

The Chairman was of the opinion that before the work was declared unhealthy, the subject should be thoroughly discussed. He thought it conducive to strength.

Mr. Lansey said he had used sewing machines for seven years, and he never knew an instance of its being detrimental to female health.

Mr. Bartlett stated that the world was indebted to America for the sewing machine. He said that the Emperor Napoleon, paid 120,000 francs for a sewing machine, as he saw at a glance that, by the possession of sewing machines, he would be provided with the means of supplying a want of which he then stood in need, viz., clothing the Imperial Guards then being organized.

A gentleman said that Mr. Hunt was the first inventor of the sewing machine.

Mr. Dibben said that when Mr. Hunt attempted to prove his invention, he could not produce his model, consequently it was decided in favor of Mr. Howe.

The Chairman enquired of Mr. Lansey if it was desirable to have the thread elastic, and also if the twist was not the favorite thread?

Mr. Lansey.—It is desirable to have the thread elastic. The twist is the favorite thread.

The Chairman.—On all the machines that you have used did you find that the work done by them was equal to hand sewing?

Mr. Lansey said that one time he had four hundred females in his employment, and he never found the work done by them on sewing machines equal to hand sewing.

Adjourned until Thursday evening, December 20, 1860.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
December 20, 1861.

Professor Mason in the chair.

J. O. Woods said he was happy to have an opportunity to congratulate the president for the remarks made by him in reference to the sewing machine. The importance of this invention to the manufacturing interests was estimated, he said, at $342,000,000 annually. It shows the annual saving by the machine in the city of New York, on men's and boy's clothing alone, to be $7,500,000 a year; on hats and caps, $462,500; on shirt bosoms, $843,750; on boots and shoes, in Massachusetts alone, $7,500,000 annually. It has revolutionized 37 distinct departments of manufactures, created new branches of sewing and extended the old, raised the labor of women, and entirely eliminated the unhealthy condi-

tions of the needlework. It has also created a saving in the manufacture of bags in the United States to the amount of $233,280; on shirts, in the United States, $14,400,000.

Mr. Woods exhibited a diagram illustrating the shoemaker's stitch, the lock stitch, the running stitch, the single thread chain stitch, and the double thread chain stitch. He also produced a board showing the three great modes of stitching. He left out a stitch in each illustration to show the effect of dropping one. The machine for making the shoemaker's stitch, he said, was never of any practicable value. A machine was patented in 1843, by Mr. B. W. Bean, for making the running stitch. The cloth was corrugated by means of small geared wheels, and through the doubles thus produced a common sewing needle was thrust, carrying the thread. The Robinson & Roper machine made several of the stitches usually made by hand. In regard to the lock stitch invented by Mr. Howe, he said that of all the stitches invented the lock stitch only commended itself to his (Mr. Howe's) favor. It is formed by two threads, one upon each surface of the fabric sewed, and interlocked with each other in the centre of it. It forms an elastic seam that cannot be ravelled, and presents the same appearance on each surface. From two and a half to three yards of thread are required for one yard of seam. This stitch resembles the ordinary weaving, and seems to be very appropriate to woven goods. It has been used for fourteen years on every species of goods, from the heaviest harness and upholstery to the finest gossamer. These stitches when formed lie slightly below the surface, so that they cannot be ironed out, and are as firm and elastic as the fabric sewed, whether subject to lateral or longitudinal pressure. The single thread chain, or crochet stitch, is in use as long as can be remembered, and was used for ornamenting cloth. The stitch is formed with a single thread as follows: a loop of thread is thrust through the fabric to be sewed, and held open until the thread is again looped and thrust through the fabric, and through the first loop. This second loop is held open until a third has been formed and thrust through it. A succession of these loopings forms the seam. The facility with which seams formed by this stitch may be ripped, and their liability to ravel, render them valueless for the general purposes of sewing. He produced a sample of magic ruffle sewed with the lock stitch, and said it rips as easily as it ravels. Suppose these two threads of the lock stitch do not

interlock we only have a stitch double the length, but it does not ravel. He showed the result of the single thread chain stitch ripping; also, the result of a stitch missed. A seam having been formed, it may be raveled like a stocking by pulling the end of the thread at the close of the seam; or, if a stitch was missed, it might be raveled without breaking the thread. He thought these facts alone sufficient to prohibit it from being brought into general use.

The double thread chain stitch is formed as follows: A loop of the thread is thrust through the fabric, and held open until a loop of the lower thread is thrust through it. This loop of the lower thread is held open until a loop of the upper thread is thrust through the fabric and through that loop, which loop, in its turn, is held open until a loop of the lower thread is put through it. At each stitch the two threads are interlooped, a loop of the lower thread passing through a loop of the upper, and *vice versa*. One objection to its use is a ridge which is formed on the lower side. This is considered so great, that manufacturers refuse to have work done by this stitch. Puckering is caused by the three threads on the lower side contracting more than the cloth. Three threads contract more than one.

Another defect is the enormous waste of thread used in the formation of the stitch. In Douglass and Sherwood's, a day's work of ten hours for one person with the lock-stitch machine, is estimated at 1,000 yards of seam, ten stitches to the inch, and use in its formation 3,000 yards of cotton thread, while the quantity consumed by the double thread chain-stitch sewing machine would be 7,500 yards. The cost of 3,000 yards of cotton thread would be fifty cents at wholesale, and the cost of 7,500 yards would be $1.25, making a difference of 75 cents a day in this item alone, or $200 a year. In shirt and collar manufacture, where the stitch is much finer, the difference per day is only about 25 cents in favor of the lock-stitch machine. In a manufactory like that of Winchester and Davies, where 400 lock-stitch machines are used, the saving is $100 a day. In quilting, where silk is used, the difference would be more than $1 a day on each machine. A single yard of silk will stretch five inches. He exhibited some specimens of work done by the double-thread chain-stitch, which to his mind were not favorable, and ought not to have been exhibited by Mr. Lansey at the last meeting, as on stretching it the stitches cracked and broke. He

also exhibited a piece of sewing done on the bias by the lock stitch, which did not crack or break on being stretched. He made this remark to show how specimens might be made up for effect, and did not think the work done by the double-thread chain-stitch equal in any respect to the lock-stitch.

The Chairman.—Do you mean to be understood as saying that there are machines that will stitch shirts as well as they could be done by hand, as to the lasting of the seam?

Mr. Woods said they would do the work as well as the hand. He had a pair of pantaloons in use for two years, made on a machine, and a stitch never ripped.

Mr. Lansey.—The stitches on the board presented by Mr, Woods do not represent them fairly. The thread in the shoemakers' stitch has the barring between the holes for its support. The barring is on the thread, and not on the cloth. (He presented a drawing which had the barring on the top and round it, thereby causing compression. He drew the chairman's attention to the ridge on the wrist of his shirt, to show that it had not worn off in the washing.)

Mr. Rowell.—How about the stretching of the three threads in regard to one?

Mr. Lansey.—The stretching is caused by compression. Any machine is liable to skip stitches if it is not in order. Work done by the double-thread chain stitch is more elastic than that done by the lock-stitch. By making the lock-stitch loose enough, you can compensate for the bias.

The Chairman.—(To a lady who was present.) Can the lock-stitch be so managed by a good seamstress as not to break?—It can.

Mr. Veeder.—(To Mr. Lansey.) Will a common operator, after a little experience, be as able to work one machine as advantageously as another? He did not think the samples exhibited fair ones.

Mr. Lansey.—You can get operators to do work well by any machine. What is wanted is to get a machine that can be easily worked in families. There is no work equal to hand work, or ever will be. There is not a machine made that can do shirts as well as the hand. There are only a limited number of good sewers.

The Chairman.—Does this apply to hand sewing as well as to machine sewing?

Mr. Lansey.—It applies to both, but more especially to hand sewing.

The Chairman.—Is puckering as likely to be done in the lock stitch as in the double thread chain stitch?

Mr. Lansey.—No. sir.

.The Chairman.—Is it true that the lock stitch will only use 2½ yards of cotton thread in forming a yard of seam, while the single thread chain stitch will take 4½ yards, and the double thread chain stitch 6½ yards?

Mr. Lansey.—I don't know. I never measured.

Mr. Woods.—In finishing a seam by any machine as much care is required in one as in the other. The most important point in a machine, after the feed and machinery is the *tension*. Five minutes a day would rewind all the cotton a housekeeper would use during a day. In the Wheeler & Wilson machine the lower thread is rewound on a metal spool of such size as to hold about 50 or 60 yards of No. 80 cotton, so that a spool of 200 yards will fill the bobbin four times. The upper thread is fed from the original spool, without any rewinding, to a small pulley, and the application of a slight pressure to this by a thumb screw is all that is requisite for a proper tension.

In the double thread chain stitch machines, the two threads are used from the original spools, and the difficulty of adjusting the tension of the lower threads, is greatly increased from this fact. The regulation of the tension properly on this machine is therefore more difficult than on any other. In this machine the great waste is on the lower side. Of the 46,243 machines required to Mr. Howe as sold in 1859, nearly 40,000 make the lock stitch.

Mr. Garvey.—If the thread was imbedded in the cloth there would be greater tension.

Chairman (to Mrs. Bush).—Have you used the three different stitches?

Mrs. Bush.—Yes.

Chairman.—How long have you used sewing machines?

Mrs. Bush.—Five years.

Chairman.—How long have you used the lock stitch?

Mrs. Bush.—About 2½ years.

Chairman.—Do you say that on the lock stitch and on the double thread chain stitch the work can be well done by any operator?

Mrs. Bush.—A girl with a lock stitch machine can do more work than one using the double thread chain stitch machine.

Chairman.—Has the hand sewing been improved by the sewing machines?

Mrs. Bush.—There is so much attention now paid to sewing machines that hand sewing is not done as well as usual. I have girls employed who have always been accustomed to hand sewing, but since they began to use sewing machines I could not induce them to return to hand sewing. I have run a machine 18 to 20 hours and was not as tired as I would be after five hours hand sewing. Hand sewing has a tendency to cause consumption. In fine sewing two bobbins will last a girl a day.

Mr. Garvey.—Great injury is done to the teeth by hand sewing, on account of the enamel being knocked off in biting the ends of the thread.

The Chairman.—Swallowing the ends of the thread was another injury.

Dr. Gardiner, of the New York Medical College.—Within the last two or three years I have paid a great deal of attention to sewing machines. If they kill one woman in ten, or maim one in five, causing them to be unhealthy, they are an evil. It has been stated that they have caused rheumatism, and after some examination into the matter I have found that they do. It is, however, only produced by the first couple of days use. It is also stated that the use of the machine has caused the women of the present day to degenerate from what they were formerly. I do not think this is so. I have found in one place in this city that the work girls could not drive Singer's machines a sufficient number of revolutions a minute to make a "paying" speed. On visiting Douglass & Sherwood's and other manufactories I have been told that the girls were benefited by the use of the sewing machine instead of otherwise. Girls, who have been accustomed to hand sewing and left it to work on machines have become healthy. All organs increase by use, and diminish by disuse. The hands and feet of the right side are generally larger than those of the left. I have found, on inquiry, that the average absence out of 100 girls employed upon heavy work with Singer's machine in one factory from all causes to be only three a day, yet, the driving of these machines requiring great muscular power did not produce any disease. I have inquired of physicians who have attended the lower class of sewing girls and have been told by them that the use of the machine does not produce disease. Their testimony corroborates my observations made during many

years experience in the treatment of female diseases as a specialty. All organs gain strength from the use of the adjacent members. Those who have a weakness in certain abdominal organs can strengthen them by the use of the machine. Amaurosis of the eye is caused by hand sewing. Hand sewing requires a constant application of the eye, but this is obviated by the machine. To do the bosom work of shirts by the machine does not require close attention. I have made enquiries of all the oculists of standing in the United States, if amaurosis is caused by sewing machines, and was told by them that no disease has ever been caused by them where it did not exist before. It also has been stated that the lint flying up from a machine is injurious to the eye. Dr. Bethune of the Massachusetts Charitable Eye Infirmary, Boston, is in favor of sewing machines and does not think they are at all injurious to the eye. Those interested in this branch of the subject are referred to a paper read by me to the New Yerk Academy, and published in its Bulletin, and also in the Medical Times, December 15 and 22d, on the "Hygiene of the Sewing machine."

Chairman (to Mrs. Bush).—In working all cotton and linen goods do you use them with the starch taken out or as you buy them?

Mrs. Bush.—As we buy them.

Mr. Young was of opinion that in the end more time would be required to earn a living by the sewing machine than was taken formerly by the hand sewing. He had a daughter who worked a sewing machine and she had to work very hard to earn four dollars a week.

Dr. Gardner.—The introduction of the sewing machine has enabled work to be so classified that instead of a girl having to work at home in a close room she has to walk several miles to and from her work, which is conducive to health.

The Chairman related an anecdote of a gentleman who had inquired into the average length of life in his district, and he found that the woman who kept no servant lived the longest, she who kept one the next, and so on. Any vigorous work that causes employment to both hands and feet is conducive to health. All my enquiries have tended to prove that the sewing machine is a blessing. Good work can be done as well by sewing machines as by hand. Singer's, Grover & Baker's, and Wheeler & Wilson's,

are the three great ones in use. The number sold by each is the best proof of their respective merits.

Mr. Veeder said that Finkle & Lyon's machine was awarded the first premium at the Franklin Institute, at Philadelphia.

Adjourned to Thursday evening, December 27th, at half-past 7 o'clock P. M.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION, December 27, 1860.

Mr. John Bruce in the chair.

Mr. Rowell exhibited a sample of buttonholes which he said were worked by a sewing machine. He was astonished that the fact of buttonholes being worked by sewing machines was not stated at the last meeting. One of these machines will stitch one hundred buttonholes per hour, and the work, after having been finished, cannot be unravelled. The work is done by two vibrating needles and an under thread. Three threads are used. By taking the thread out of the needle that goes outside of the cloth you will have the regular Grover & Baker stitch. He procured the specimen of work exhibited from 596 Broadway. The machine for making those buttonholes was patented by Mr. Vogel.

Mr. Koch said that in the other machines the holes had to be drawn in a circle so as to be sewed.

Mr. Rowell.—That has not to be done with this machine.

Mr. Dibben.—Buttonhole machines are not a new invention. They have been in use since the first exhibition at the Crystal Palace of New York. During the operation of sewing those buttonholes, there is great difficulty in keeping the cloth even. It is worked through two pieces of cloth, and sometimes through three and four.

A Visitor.—Does this machine make as good a stitch as the Wheeler & Wilson sewing machine does?

Mr. Rowell.—It does better work.

Visitor.—Can it be used for working on embroidery?

Mr. Rowell.—It can.

MOTIVE POWER.

Mr. Dibben said, whatever may be the hopes and desires of the community to have extraordinary safe agents for motive power, the one that will be generally used is the cheapest one, and the

main question which we will have to consider will be one of economy. I will consider the one that I will speak of as a one horse power. I will begin with the steam engine. I suppose a steam engine of one horse power, to cost from $300 upwards, to run at a cost for fuel of ten pounds of coal per hour, or 25 cents a day; the wear and tear of such an engine will be about seven cents a day. This engine, though small, will require an intelligent man to attend to it. Such a man will require to be paid $1.50 per day, and the engine occupying about one-sixth of his time, the cost for attendance will be 25 cents per day, making a total cost per day of 57 cents for fuel, wear and tear, and attendance. This is seemingly a nominal sum for a one horse power, but I think it can be done for that. The principal question is capital, as it will take $300 or $400 to put one up. The nett cost of a one horse power air engine will be $600, twice that of a steam engine. The fuel consumed by an air engine will be ten pounds of coal per hour, or 25 cents a day; interest and wear and tear, 12 cents a day; the attendance required will be less than a steam engine requires, say one-twentieth part of a man's time, or less than that, bringing the cost of attendance to about 7½ cents per day, making a total cost of about 44 cents. An air engine can be worked by a man of less capacity than a steam engine requires. The only point on which an air engine has been attacked, is its liability to wear out from overheating. For agricultural purposes, the horse power is more generally used. The cost of horse power is less than is generally believed. The only reason the generality of farmers have not horse power with a system of gearing, is the first cost. The cost of setting up a one horse power is about $150, and that is a large sum for some of our farmers to invest in machinery.

Mr. Haskell.—What horse power do you consider the best?

Mr. Dibben.—The best one horse power that I know of is one which I saw exhibited some years ago at an agricultural show. It was composed of three pair of wheels on a frame principally of iron. I think it was called Child's one horse power. The cost of board for a respectable horse, is about $20 a month. A farmer can keep a horse for 20 cents a day. Some horses have been worked by the use of a bell, stopping and going on as the bell was rung for them to do so. I think the cost of the horse and horse power would not exceed $300 to a farmer; the wear and tear would be about five cents a day, and the whole cost per

day would not be more than forty cents, air engine forty-four cents, and the steam engine fifty-seven cents; therefore the horse power is the most economical.

A Member.—You have to feed the horse whether you use him or not.

Mr. Dibben.—If you do not use him at the horse power, you can use him at something else.

Mr. Stetson.—One of the great objections to horse power is its unsteadiness. A horse requires a self-whipping improvement to keep him going. I have known steam power to be substituted for horse power, and the great saving occasioned thereby was the whip being dispensed with.

Mr. Veeder.—It is evident that where farming is done on a large scale, such as on the prairies, other power than horse power is required. The ordinary power used is the two horse endless chain power. In threshing, a great deal of room is required, any it is also necessary to do it quickly on account of the number of hands that have to be employed. One man is required to feed the machine, and another to take the straw away, and other hands besides. You may get a horse power to churn and do such like work, but for heavy farm power, you require other power than horse power. In the State of New York, very few farmers have a threshing machine of their own, but depend on those travelling with them through the country.

Mr. Babcock.—I think Mr. Dibben has underrated the expense of a horse power. The wear and tear is more than he has stated. A good horse, well cared, will not last on our city cars more than six years. Mr. Dibben makes out a fair story for the air engine, but not as good as he should have done. There is at present in the village of Westerley, Rhode Island, a twelve inch air engine working which is driving two printing presses. It uses about fifty pounds of coal per day, at a cost of 12½ cents. Another 18-inch caloric engine is driving a cracker bakery at Pawtucket. In this cracker bakery, before they put in the caloric engine, the most they could make was about ten barrels of biscuit per day. I do not think the engine in use there is more than a two horse power, and it costs about 15 cents a day. I refer to the Wilcox engine; it makes twelve barrels of biscuit per day.

Mr. Fisher.—Tredgold states, that, in estimating the power of heavy horses, they cannot do more than lift 22,000 lbs. weight a foot high per minute, for ten hours a day. The proprietors of

stage coaches in England state that the wear and tear of horses is about 33 per cent. The cost, wear and tear, and shoeing of a horse, is about 20 cents a day. For mechanical purposes, a horse has to be taken care of, and it is easier to take care of an engine than a horse. It is claimed that the caloric engine is safer than other engines, but I should say that a low pressure engine is just as safe. What are called low pressure boilers have sometimes bursted. I do not think that the air pump would add 15 per ct. to the cost. In the high pressure engine, the only danger is the outer shell.

Mr. Garbanati.—The most impolitic thing a farmer can do is to put his own team into horse gear. Irregularity in stopping is detrimental to machinery. A horse that is fit to do any other work is too good to do the revolving horse work. I think the question of the one horse power for farmers is a move in the wrong direction.

Mr. Stetson.—There are several reasons why England can use steam power for farm purposes, instead of horse power, to better advantage than can be done in America. England is the workshop, and America the farm. Mr. Dibben's estimates are pretty reliable, but I think he has estimated the wear and tear at less than what it really is. The lubrication of machinery, and the wear and tear of boilers ought to be taken into consideration. An engineer on the Ohio railroad once assured me that he had to run his engine tied up with withes. I think, taking this and other like things into consideration, there is a great deal in favor of horse power. If a high pressure engine would cost $600, I think a low pressure of the same horse power would cost $900. The advantages of using water engines are very few on account of the difficulty of finding a sufficient headway of water. In the "Traveller office in Boston," the water power drives the press. The hydrants being close at hand they made a contract for a supply of water, and a small half bushel rotary engine was put in and is worked very successfully, but situations such as this are difficult to be obtained.

Mr. Bruce.—Have you taken wind into consideration as a motive power?

Mr. Stetson.—I know very little about wind.

Mr. Bruce.—Wind has been successfully used in England.

Mr. Dibben.—That is so, but windmills have never been successful in this country.

Mr. Bruce.—There was one in Jersey which was a perfect success.

Mr. Dibben.—I have left the estimate of the wear and tear at a low figure, but have made up for it in the attendance. A good horse of 1,400 lbs. weight will lift 22,000 lbs. a foot high per minute, and continue it for eight hours per day. The useful work is about twenty per cent. less.

Mr. Stetson.—Is not this an unusual horse, and can such a one be bought for $100?

Mr. Dibben.—You could not get such a horse for $100. I have set down the cost per day of a one horse power steam engine at fifty-seven cents per day, of an air engine at forty-four cents, and of the horse power at forty cents. In doing so, I think I have made a fair estimate. The investment of capital on a farm in England for apparatus is about £10 ($50) per acre, more than it would cost to buy out the land here. Labor is also cheaper in England. An air or steam engine has to be fixed up before using it, but the horse is always at hand, and when the work is done you can put him in the stable or turn him out into the field.

Mr. Babcock.—The air engine used in Pawtucket does not use more than 50 cents worth of coal per day. It cost $500, and I think that 45 cents per day will cover all the expense for wear and tear, &c. This refers to a two horse power. I think the cost of a one horse power engine will be about 30 cents a day. The cheapest power which we have anywhere is water.

The Chairman.—Cheaper than wind?

Mr. Babcock.—Yes.

Chairman.—It cannot always be made available.

Mr. Babcock.—That is so, and for that reason it cannot be used generally by farmers. For farm use wind power is out of the question.

Mr. Bruce.—I think it could be used on prairies.

Mr. Babcock.—Steam engines from two to ten-horse power can be used with great advantage for farm purposes, and the only objection to their use is the danger which is attached to them and the attendance they require. The air engine is better fitted for farm purposes.

Mr. Seely.—There are many considerations which outweigh the cost of a machine. I think no farmer can use any engine that would cost $600, or even $300. Interest is an objection also. Farmers must have horses, and I think that neither a steam or

an air engine would be profitable for a farmer. There are very few farms of 100 acres on which there is not a stream that could be put to good use in driving a water engine at a little expense. If you could change the air, which drives a mill at one time with great force, and at another time with little force, into a constant, steady current, it would be a great advantage. I have very little love for horses, and would like to have them driven out of the streets of the city. I think we will one day have a power combining the advantages of air and steam.

Mr. Johnson.—Mr. Kennish, of No. 4 Cedar street, New York, has a hydrantic motor which can be seen at the yard of the Brooklyn Water Works near the Navy Yard. Six gallons of water is used for a revolution, and sixty revolutions is said to yield ten-horse power.

Mr. Stetson.—I think small wind-mills deteriorate about 100 per cent. per annum. Small engines, in my opinion, are a failure. I saw fifty-four windmills at work in a harbor near Cape Cod. The same power which may succeed for farm purposes will not succeed in farm buildings or on sewing machines.

Mr. Rowell.—Could not some small animals be made to drive the sewing machines? I have seen a dog drive a churn. A friend of mine had two Newfoundland dogs which did light sawing for him two hours each day. He fed them on the sweepings of a cracker bakery, and scraps of fat, at a cost of six cents per day for each dog. When fed on meat they would not work.

Mr. Bruce.—I can't see why they do not bring the hog into requisition.

Mr. Dibben.—There are points on our coast where windmills can be used with advantage, but in the interior of the country we would not probably have a breeze sufficient to drive a wind mill for an hour more than once a week. You cannot go into any small town of 500 persons in the interior of the State of New York, or any other State, in which you will not find a man who has not a claim or patent for some windmill. The cheapest and most practical power for driving the sewing machines in a family is the foot. The trouble with the sewing machine is the stopping and starting. If there was any great trouble in driving sewing machines we might look for some other power besides the foot.

Mr. Van der Weyde.—In Holland they have windmills in constant use for every kind of work. Ninety-nine per cent. of the

power used there for keeping out water is the windmill power. Each mill has three men to attend to it. There are different kinds of windmills there, but the smallest one I ever saw there is larger than the largest one I ever saw here. In that way they compete with steam.

Adjourned until Thursday evening, Jan. 10, 1861, at 7½ o'clock.

American Institute, Polytechnic Association,
January 10, 1861.

Professor Mason in the chair.

The Chairman proposed the following subject for future consideration: "The effect of temperature, and the force operating in crystalization."

Mr. Haskell submitted the following, for the same purpose: "Artificial members of the human body."

Mr. Stetson proposed the subject of "Compressed air, and its use in propulsion."

Mr. Holcomb introduced a new telegraphing apparatus which possessed the power of telegraphing by one or two currents. He introduced permanent magnetism into his invention, and intended to produce signals by sound. By his plan he is enabled by one movement of the key to get both combined. Third and fourth râte operators now operate by sound. Another improvement was the new spring he introduced. When this spring is applied there is not much difference between a weak and a strong current. He claimed the advantage of doubling the motive power by permanent magnetism. The key connects in such a way that the current is reversed at one stroke. He stated that the generality of operators attributed all their difficulties to permanent magnetism.

Mr. Stetson.—Can you telegraph further and faster by this machine?

Mr. Holcomb.—You ought to be able to do so. It will take two motions to make one signal.

Mr. Seely said that if the gentleman's views were correct he had made a valuable discovery. He thought the experiments made were not without objections. In a position without touching the key the current is passing. By pressing the key the current is broken, and by pressing it still further it is reversed. Then by removing the pressure the current is restored.

Mr. Tousley presented one of Vogel's patented button hole sewing machines, and said:

We claim for this as great a gain as has ever been attained by the sewing machine. We make by it six different stitches, and it is so simple in its mode of operation that it can be worked by a mere novice. One of these machines will make one hundred button holes an hour. We can carry one, two, three, four, or five threads, and can bring the cord above or below the button hole. We can work any class of goods from the finest fabrics to harness work. The machine makes two different button holes. One of them on being presented to a tailor for inspection would be called by him a French button hole, made by hand. By the use of another stitch we can make a button hole finished on both sides.

The Chairman.—Have you considered the subject of making the stitching extra strong at the place of fastening?

Mr. Holcomb.—Yes, sir, we have.

The Chairman.—How many of these machines have you in use?

Mr. Holcomb.—About 200. They have not been introduced into tailor's shops as yet. We can make six different embroidery stitches by this machine. By the foot I can run it for a single stitch and then stop. We do not use any feed in the market, but have our own patented feed. This machine in working covers the edge of the goods, but in others the stitch is carried crossways, back and forth. It can make a stitch resembling the Grover & Baker stitch, and also the shuttle stitch. These machines are made of the best steel, and I think one of them will last twenty years in constant use. They cost $100 each. There is no other machine in existence that will make button holes rapidly.

Mr. Bull.—Is there any difference between your button hole stitch and the one made by hand?

Mr. Holcomb.—There is, and I think the one made by this machine is the more elastic. The one made by hand is rigid and hard, and easily worn out by the button. If it is elastic it is not worn out so easily. It is as strong and elastic as the Grover & Baker stitch. The motion of this machine is different from that of other machines. We can operate it by the foot, and also by the crank.

POTTERY.

Mr. Johnson presented a number of drawings for the purpose of explaining the composition of the different kinds of clay used in the manufacture of pottery. He stated that he was disappointed at the absence of Mr. Davis, who, he expected, would have been present to give his views on this subject. He gave an analysis of the Cornish stone, which he stated was composed of quartz and felspar mixed. China clay is composed of silica, alumina, protoxide of iron, lime, magnesia, water and alkali. English China glaze is composed of Cornish stone, calcined flints, carbonate of lime, Cornish clay, soda, borax, and white lead. These are fritted together with 20 per cent of white lead and 10 per cent of flint. Black Etruscan vases are composed of silica, alumina, oxide of iron and manganese, carbonate of lime, carbonate of magnesia, carbon and water. Greek vases are composed of silica, alumina, oxide of iron, lime and magnesia. The common stone ware is manufactured from the clay as found, and sometimes with the addition of sand and broken stone ware. Other diagrams which he exhibited showed tables of the composition of clays and porcelain ware free from water, and of different kinds of colored ware; also, of the composition of hard and soft china.

The Chairman stated that all clays contained a metal, and that that metal had a great deal to do with making clay hold oil, water, &c.

Mr. Rouse, of New Jersey, said about two-thirds of the clay used in the manufacture of pottery in this country is Jersey clay. We get clay from Connecticut, Georgia, and other States. Clay can be furnished us as cheap from Europe as it can from Georgia. The manufacturing of the material is more expensive than the material itself. If we make $60,000 worth of goods $30,000 of it would be for labor. All potteries have failed in this country until within these six years past. There are seven manufactories at present in Trenton. We get the flint and borax duty free. We import the English flint prepared at a cost of less than one cent a pound. We also use felspar. The only difficulty we labor under is the iron that is found in every clay, to extract which is nearly impossible.

Chairman.—Do you know what it costs to break the rock flint and reduce it to the form in which it is imported.

Mr. Rouse.—I do not. Flint is not found in this country at all.

Chairman.—Have you made any porcelain?

Mr. Rouse.—No, sir. There was some made about 25 years ago, but it did not pay.

The Chairman asked Dr. Stevens where the blue clay was found?

Dr. Stevens said it was found in the southern part of Illinois, North and South Carolina, Arkansas, Alabama, Mississippi, Red River, Nebraska, New Jersey, Georgia, and other States.

Mr. Rouse.—It requires great nicety to mix the different clays in making pottery. Too much of one clay might spoil the whole composition. The material used for glazing costs eight cents per pound, and that which we use we get from England. It is composed of borax, whiting, and two other ingredients. Cups and saucers are moulded in plaster of paris.

Dr. Stevens.—Jersey clay contains silex, lime, and potash. If it contains too much potash it runs. These clays are derived from the decomposition of rocks. It underlies all Long Island, and is found near the surface of the earth in Staten Island. It is also found near Perth Amboy. The porcelain clay is what we call felspar. The aluminous stone, unless well baked in the earth, is much inclined to return to its original state. Silex, lime and alumina makes a very good fire ware. One of the greatest difficulties in getting clay fit for all kinds of ware is that of getting it free from sulphate and sulphuret of iron. In New Jersey there are beds of sunken wood so saturated in sulphate and sulphuret of iron that on being exposed they become immediately coated.

Member.—Would the presence of lead and zinc add to its adhesiveness?

Dr. Stevens.—I think it would act as a glazing power.

Mr. Rouse.—I wish Dr. Stevens would suggest a way by which we could get the iron out of the clay.

Dr. Stevens.—That is nearly impossible to be done. I think at this time that we make all the porous cups for batteries that are used in this country and the Canadas. We have just executed a very large order for the Grand Trunk Railway, and another for the Montreal Railway. The directors of these railways have stated that they have desisted buying from Europe, having found that that which is manufactured in this country is the

best. About $\frac{1}{1000}$th part of the crockery used in this country is manufactured in America.

Mr. Bartlett.—The great success of the French potteries was due to the fact of the models being furnished by the French government. The whole art, he said, was sustained by the French government.

The Chairman.—It is part of the French nation to cultivate nicety and refinement in the arts. The first folly of cotton manufacturers in this country did not exceed the folly of those who attempted to make pottery here. I think the loss sustained in the manufacture of pottery in this country, from the time it was commenced to be made, does not fall short of a million of dollars. The great trouble here is, that when wealth has accumulated it does not find its way into the hands of scientific men. I will go further than Mr. Rouss went, and say that $\frac{95}{100}$ths of the cost expended in the manufacture of pottery is for labor. Take four cities out of the State of New York, and it will be found that our population has diminished instead of increasing.

Mr. Rouse.—In Staffordshire, the whole district where the manufactory of pottery is carried on, is only about 16 miles long by 8 in breadth, and in that space there are 100,000 people employed. When there is trouble in this country, the trade is completely shut off in England.

Dr. Stevens.—From samples of ancient pottery which I have seen, it seems to me that they were not very well acquainted with the art of glazing in those times. We have in the United States at present the remnants of Indian tribes who were, and are still, well acquainted with the manufacturing of pottery. These Indians are called the Pueblo. The largest of their tribes is the Zoolo. They build cities which will hold as many as 10,000 inhabitants. Their streets are mere alleys, so narrow that only two abreast can travel along. Their houses are six, eight, and ten stories high, built of stone, and so formed that they prove a great defence against the Comanches and other tribes of Indians, who are hostile to them. A great portion of the Zoolo Indians are white, with blue eyes, and are extensively engaged in the manufacturing of pottery. They are famous for making a peculiar kind of blanket, which no other Indian tribe can make.

Mr. Johnson.—English artists gave Mr. Prosser the credit of making pottery superior to other men.

Mr. Rouse said that the greatest difficulty in getting good workmen was on account of the short apprenticeship they served. He thought that a seven years apprenticeship was little enough to make an apprentice proficient in the art. Instead of their serving that time he found it very difficult to get young men to remain longer than three years in his employment as apprentices.

Mr. Johnson wished that the first half-hour of the next meeting would be devoted to Mr. Davis, for the purpose of allowing him to express his views on the subject of pottery.

Adjourned to Thursday evening, Jan. 17, at half-past seven o'clock.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
January 17, 1861.

Professor Mason in the chair.

Dr. Van der Weyde said, in reference to the subject of "the different methods of using electricity to ignite inflammahle substances":

The idea of lighting inflammable substances by means of electricity is not new; the ignition of alcohol, ether, gunpowder, &c., by the electric spark, is one of the oldest experiments in that branch of physics; later the power of galvanic currents in heating this metallic wire has been used for blasting purposes, and also for lighting candles, lamps, &c., and finally the sparks of galvanic induction currents have been used to light gas.

Some patents have been taken out for those purposes, and it may be interesting to give here the several methods in the same order as I did give them to demonstrate to my class in chemistry in the Cooper Institute, in this city, this kind of practical use made of electricity.

1. The spark of a common electric machine, igniting all kinds of inflammable substances, solid, as rosin, gunpowder; liquid, as alcohol, ether; gases, as hydrogen, carburet of hydrogen, &c. This is an application almost 100 years old, and now repeated in all courses of Natural Philosophy.

2. The small spark of the electrophorus. Some 50 years ago small apparatus were for sale, when by only turning the stopcock of a hydrogen gas jet, a small spark, produced by a permanently charged electrophorus ignited the hydrogen and this a lamp and candle. Such an apparatus I have in the collection of

the Cooper Union, and applied it years ago to the ignition of common coal gas.

3. The platina wire heated by a galvanic current, is often used in experimenting to ignite all kinds of vapors, gas, lamps and candles. I have still an old apparatus made for this purpose, and applied it practically (however on a small scale,) in my lecture on physics in 1842. It is also extensively used for igniting gunpowder in blasting rocks, as the easiest way to reach them if they are under water; it has been done in the harbor of New York, and in Hurlgate, by Maillefert. However this method was never applied on a large scale for lighting gas till some years ago Gardner obtained a patent in this country to light many gasburners in the same time, by platina wire, heated by a powerful galvanic battery.

4. It is a common experiment at present, that the rubbing of the feet on the carpet in a very dry room, will produce electricity enough, and charge the person with it, so that by touching the gas burner with his finger the experimenter may produce a small spark, which will ignite the gas.

5. As such a small spark is sufficient to ignite inflammable gases, it is clear that with a powerful apparatus we may produce 100 sparks at the same time, at the jets of several hundred gas burners, so with a galvano-electric induction apparatus, invented by Rumhkorf, in Paris, (the most powerful electric machine yet known,) we may light several hundred burners if we connect them all with metallic wire in such a way as to produce a spark at each gas jet. It is for this application of electricity that Mr. Wilson obtained a patent; it is applied at the Cooper Institute, where the 300 gas burners in the large hall in the basement are lighted by sparks obtained from a Rumhkorf induction coil, conveyed from my laboratory, five stories above, along isolated wires partially hidden in the walls of the building, over a distance of about 1,000 feet. This Rumhkorf apparatus is based on the same principle as the well known galvanic-electric or so called shocking batteries, in use for medical purposes during many years, and for every slight modification of which several patents have been taken out. The most important modifications, however, are those applied by Rumhkorf to the machine bearing his name. This is of course not patented, but belongs to the scientific world, and perhaps is nowhere better made than by Ritchie, in Boston, who manufactured the apparatus of this Institute.

6. As the expense of such an apparatus is $150 to $300, is one objection; a patent was taken out by Mr. Seely, of this city, to substitute for the former apparatus, a common glass disk electric machine, hermetically inclosed in a glass case, and kept perfectly dry with chloride of calcium to secure it against the occasional dampness of the atmosphere, which is the cause that common glass electric machines do not work half the time. Similar machines have been made in Holland 20 years ago. One is now in possession of the University of Groningen.

7. Very recently a patent was taken out by Mr. Batchelder for the connection of a vulcanized India rubber disk of 3-inch diameter, with the chandelier in which it is hidden; by turning a knob at the lowest part of the chandelier it produces by friction some electricity, which is conducted by isolated wires to the six or eight burners of that chandelier, producing there little sparks sufficient to light the gas.

8. Still later a patent has been applied for, for a similar India rubber disk, which, by turning, lights a small alcohol lamp, and thus allows one to dispense with the use of matches. I must here observe that India rubber and gutta percha are much less apt than glass to condense moisture from the atmosphere on their surface, and therefore electric machines made out of those substances are more certain in their effects than the glass machines, and about as certain as the machine mentioned under No. 6, above.

9. As the large battery used in No. 3, above, for the heating of the platina wire, may be considered an objection, I experimented more than a year ago to effect the same with a magno-electric apparatus, in which a soft iron core is unwound with a coil and revolves in front of a bundle of seven powerful steel magnets of horse-shoe form, of two feet length. As the quantity of electricity produced in this way is sufficient to heat this platina wire, as all those know who are acquainted with this apparatus, this heating being one of the common lecture room experiments, nobody will doubt that I am able to light gas with it, and every one else may.

(Dr. Van der Weyde here tried the experiment of lighting the gas by this process, and after a few attempts succeeded in doing so.)

Also this arrangement has been applied to produce electric currents for medical use. The slightest modification in it has

been seized upon to secure different patents. I have also succeeded in modifying it so as to make it more portable; my latest arrangement is so small that a physician may place it in his pocket, and by all that it is as powerful as the larger magneto-electric induction apparatus in large boxes of ten to twenty pounds weight, and patented over and over again. My arrangement is not patented and may be seen in my laboratory.

10. But as it requires less quantity of electricity to produce sparks than to heat wire, and as sparks may be multiplied with infinitely more economy than the heating of many pieces of wire at each burner, I soon conceived the idea of applying the spark of such a magneto-electric apparatus for this purpose. By the usual construction, however, the wires in the coil are not carefully enough isolated to produce sparks so long that they may be made available and many times sub-divided, and a large apparatus is being constructed, expressly in this view. It consists of a coil of soft iron wire, similar to that in the Rumhkorf coil, but wound only with the careful isolated fine wire of several thousand feet in length; the large wire for the galvanic current is omitted, as the iron coil is magnetized by the poles of powerful steel magnets, rapidly moved along its extremities.

11. But there is another form of magneto-electric apparatus, invented a few years ago in France. It consists of a bundle of horse shoe steel magnets, powerfully charged, with their poles rounded off, and the steel itself wound with the usual coil; if now in front of those magnets a soft iron in the shape of a common keeper is revolved, the rapid changes in the free magnetism of the steel produces electric currents in the coil, more powerful than if the coil is wound around the revolving piece, or soft pieces of iron, as in the arrangement described under Nos. 9 and 10 above. Experience has confirmed me of this greater strength, a fact which I, *a priori*, theoretically expected. I have both constructions, and many others besides, in comparative operation.

12. I have projected and made provisional experiments with two very different applications of this principle, by which the power will increase so greatly that it will produce sparks amply sufficient to light 100 or 200 burners, if not able to compete in length of spark with the Rumhkorf coil, and will, like numbers 9, 10 and 11, above, have the advantage over this coil of being less expensive and independent of the galvanic battery, which, besides, is a permanent trouble and expense, and if accidentally

out of order—as all galvanic batteries sometimes are—refuses to produce the usual results; the steel magnet being the producer of electricity, gives this in a constant form, as those magnets, if well made, are always the same and never lose their power, as almost every one knows.

My first construction is this: two straight cylindrical steel bars of about one foot long, each composed of three, five, or seven flat bars, secured parallel together with screws, and afterwards turned cylindrical, are as strong as possible magnetized, and is inclosed in a glass tube of the same length, and open at both ends; around this a coil is wound for the whole length, however, in such a way that the winding is the thickest where the greatest magnetic intensity resides, that is towards the poles; towards the middle or neutral part of the bars the layer of coil is only thinly covering the bars. Those thus coiled, magnets are secured in a horizontal and parallel position, on a wooden basis, one at each side, equal distant and parallel to a horizontal axis which is a little longer than the bars;. at each extremity of the axis is attached a keeper, at right angles and at such a distance that by turning the axis the keepers pass with their ends, very closely along the extremities of the steel magnets; which of course lay with the opposite poles towards the same keepers. It is clear that this arrangement works like the double of the apparatus, number 11, above, and has besides the advantage of all the magnetic surface of the steel magnets, being made available by the coil.

13. The second construction based on this principle, has been made by me, however, on a small scale only; it is so different in appearance and the manner of its operation from the former, that it may be considered by some, an altogether different apparatus; it only requires to be made of large size to produce powerful effects, perhaps surpassing number 12, above.

It consists of two strong horseshoe magnets, of polished steel, with cylindrical extremities, lying on a horizontal base and touching each other with their opposite poles, which are situated in a coil of fine, well isolated copper wire, immovably fixed to the said base; the magnets may slide in and out the two coils, if now by means of a lever the poles of the two horseshoe magnets are suddenly separated inside the coils to the distance of $\frac{1}{8}$ to $\frac{3}{4}$ inch, their magnetism made latent by the contact, is suddenly set free, and they induce an electric current in the coils;

by joining the magnets again, a current will be developed in opposite direction; if desired, those two currents may of course be led in the same direction by the ingenious contrivance, well known as the commutators, attached to the same lever.

About the three different kinds of magneto-electric apparatus mentioned above, under 9, 10, I wish to observe that all experimentors, even those who made the largest, did (as far as I have been able to find out) seek more for power in a great number of coils and magnets, than in a single one or a single pair of very large size, and by this made an isolation as perfect as that in the Rumhkorf coil, an impossibility.

The largest apparatus of this kind I met with was one imported from England, intended to produce electric light; it consisted of a few hundred tolerably sized steel magnets and some eighty or one hundred small coils, of the most unphilosophical construction; it required at least three or four horse power to run it, and the only thing to which those who had charge of it—and by the way who proved not to understand much of electric science—could turn this large apparatus into account, was in electro-plating, to an amount equal to that accomplished by a common battery, at the expense of the consumption of a few ounces of zinc. A company was formed to electroplate in this way; a small bungled imitation of the large apparatus made its appearance at one of the exhibitions of the American Institute, at the Crystal Palace, and, of course, the company soon wound up with considerable loss, except perhaps to its director, Mc S., who departed. I do not here assert that this way of electroplating or electro-typing is impracticable, but a small apparatus, moved by a very small fraction of a horsepower, will accomplish it, and may, in some peculiar circumstances where there is power to waste, be used with profit. However, if one uses a common Smee battery and sells the products of his battery, the sulphate of zinc, he will very nearly be compensated for the common sulphuric acid and metallic zinc, and his electric current will cost him very little.

Suppose that Rumhkorf, instead of making his large magnificent apparatus of one single coil, had constructed fifty or one hundred small induction machines like they that are used in medicine or a little larger, and had connected them to receive the current of all, would he have retained such glorious results as by winding all the wire in one single coil, thus securing larger

distances and room for an isolation with glass, gutta percha, silk, &c. It is equally the reverse of all the magneto electric machines, which all consist of an accumulation of small, weak, deficient ones, united on a single axis, and the work I am occupied with for some time is to make a magneto-electric machine, similar to the galvano-electro of Rumhkorf. Those magneto electric apparatus, may be used with the most perfect safety for blasting purposes, which is not the case with the galvanic batteries used thus far exclusively, because with the last an ignition by simple contact of the wire leading to the blast and to the battery, has often happened, and produced a premature discharge and dreadful accidents. With my apparatus, the wire may be all connected, no electric current being possible before the apparatus is set in motion with a certain velocity, and consequently no discharge can take place before it is desired, and the motion actually is produced. An additional guard may be added by placing some obstruction in the rotary wheels, or taking out the handle, or simply locking the apparatus up in a small box.

A very weak, almost invisible spark, may ignite gunpowder, if the points producing the spark be separated by a piece of very thin paper covered by a mixture of two parts of sulphuret of antimonium with one part of chlorate of potash; this, or a very similarly prepared mixture, is now sold under the name of magic wafers.

This mixture is exceedingly explosive by weak electrical currents, and safe against rubbing, just the opposite of the common matches. I am able to ignite it with my smallest magneto-electric batteries, made for medical purposes, producing only very moderate shocks, and scarcely any sparks. The distance at which it is made to work is of no account. It explodes at 5,000 feet as readily as at five. Some of these batteries are so small that they are enclosed in a box two inches high, three wide and six long.

As I never made a secret of most of these investigations, but communicated them freely, more than a year ago, to several persons, also to my class in my quality as teacher, to post them up in the newest branches of investigation, I have been brought in the necessity to have them published, with the remark that "I reserve for myself the right to take out a patent for the improvement of the magneto-electro apparatus, as mentioned under No. 10, and for the invention of the apparatus under Nos. 12 and 13 above; also for igniting gas, gunpowder, &c., by means of heated

wire or sparks produced by the said pure magnetic apparatus, requiring no galvanic batteries.

POTTERY.

Mr. Seely.—The art of pottery is the oldest of the arts. 4,000 years ago the tower of Babel was built, and it is said that it was built of burnt brick. If clay is well dried, and does not get wet it lasts a long time. A house on the river Nile built of unburnt brick will last as long as a house built of burnt bricks in this country. In Nineveh and Mesopotamia bricks have been found in a good state of preservation with inscriptions on them. The side of the bricks having the inscription on them was put inside, and the plain side outside. No art has been brought to such a state of perfection as pottery. It is no new thing for a farmer in Western New York to plough up a piece of Indian pottery. The ancient pottery was quite rude, chemically considered, to what we make in these days. The Grecians manufactured pottery which was equal to our best in regard to form, but the ware was only equal to our poorest ware. They knew very little about glazing. The first drinking vessels were made of horn.

The Chairman.—Drinking horns were in general use where I lived during the revolution.

Mr. Seely.—China ware is an invention of the Chinese, and they claim that it was manufactured many years before the Christian era. It is only during the last century that they have succeeded in making it in England. Bethica was the first inventor of it there. Clay, chemically, is composed of silicic acid and alumina. Pure clay is silicate of alumina. Such a material as this is not found in nature. Quartz is composed of felspar, mica and quartz.

The Chairman.—Is it not always found necessary to remove some of the silica that is found in all clays before they are manufactured?

Mr. Seely.—No; silica is sometimes added. If you examine a piece of porcelain with a microscope you will find that it is composed of small particles covered with a glazing. Pure clay is infusible; alkali added makes it fusible. If you get too much silex it will not be plastic enough. Take a lump of cast and a lump of wrought iron and put them in a crucible and you cannot melt them. The common notion is that fine clay is particularly

fusible, but that is not so; china is more fusible. The colors which are given to pottery are taken from metallic oxides. He did not think that the analysis of the different kinds of pottery presented by Mr. Johnson, chemically speaking, represented them properly.

The Chairman (to Dr. Stevens.)—Can you give us any geological reason why the bricks become paler as you leave the sea-board and come nearer Milwaukie? They are nearly pale when we get there.

Dr. Stevens.—Because there is not so much iron in them. The clay of which the Milwaukie bricks are manufactured is composed of Debonia strata.

The Chairman (to Mr. Seely.)—Would it be expected by a chemist that a brick pressed out of a mass and burnt would be a tenacious brick?

Mr. Seely.—It would.

The Chairman said he could take one of those bricks so made and break it to pieces with a cane.

Mr. Johnson stated that he saw bricks made in Poughkeepsie, which yielded on the pressure being removed.

Mr. Garvey did not think that the finish of a brick depended on the pressure. He found in the ordinary hand brick that it was an advantage to make them porous; also, that if the outer surface of a brick is more burnt than the next stratum it would not be homogeneous, and would flake off.

The Chairman.—When I break a well made brick, composed of a mixture of clay and sand, it presents a glassy surface where broken. That is not the case in one made by pressure.

Mr. Dibben.—Dry clay bricks will never make a good wall to stand the effect of the weather.

The Chairman.—The building belonging to the society of the Deaf and Dumb Association has been built of Milwaukie bricks, and I have found that the north side of it, where the sun does not shine, has become quite green. Is this a vegetable growth? Is it there because of the absence of iron?

Mr. Johnson said the same could be observed on Trinity building.

Mr. Garvey did not think the composition of the clay had anything to do with it. He thought the moisture was the occasion of it.

Mr. Johnson said that some samples of pottery which were on

the chairman's desk were pressed with a pressure of 250 tons, and that they were harder than the ordinary burnt porcelain.

The Chairman.—Can we make a step forward so as to guard our buildings by making bricks impervious to water? We have learned to make mortar more perfect within this last five years. This improvement consists in properly sifting the sand, then adding a finer sand, and after that the lime in such a state as to enable it to surround every particle of the sand. Mortar made rightly, and applied in a thin coat is an imperishable substance. If we can make bricks entirely impervious to water they will be better than stone.

Mr. Johnson said that in London the tiles were glazed, and that the outer surface of the bricks are glazed in Brighton, England.

A Visitor.—Such a brick as that was made in the Bennington pottery.

The Chairman stated that that pottery had failed long since.

Mr. Garvey.—No face to a wall would be better than a surface of mortar. If magnesian lime is selected you cannot accomplish anything. Well burnt bricks should be well saturated and free from dust before being used, and then by covering them with a coat of mortar they would last for ever.

Dr. Knight presented several samples of Silexian marble, and said:

This is a compound, the base of which is lime. It was introduced into this city in 1852, by an Englishman. Kean's cement is used in the manufacturing of it. The patent for it was disposed of, for use in this city, for $5,000. It will bear more heat than marble, and you can make a shelf of it very thin and still it will bear to be carried by two men, one at each end, which is not the case with marble. Mr. Sherwood of Greenwich, Connecticut, is now manufacturing it. The only fault it has is, that it cannot be made to pay the manufacturer. It requires four hours to have it set without any heat.

The Chairman.—How does it bear the fire?

Dr. Knight.—Much better than marble.

Mr. Stetson.—Is Kean's cement used all through the mass, or only on the surface?

Dr. Knight.—It is used all through it. The middle is made of the same material, only coarser.

Mr. Johnson.—Will it retain moisture?

Dr. Knight.—It will not.

Mr. Garvey said he saw nothing very wonderful in it. It was only a refined form of Roman cement. Oxydes have been used by the Greeks and Romans. Artificial marbles have failed on account of the mode of working them. Marbleized iron has a preference over this material. Marbleized surfaces have been put on slates, and have produced some very pretty patterns.

Dr. Van der Weyde made some further remarks in reference to telegraphing. He stated that magnets never lose their power, and to prove which statement he produced two magnets, one of which he said was twenty years old, and another one, a natural magnet, that had belonged to his grandfather, which was a hundred years old, both of which on being tested proved that they retained their magnetic power. He also stated that if a piece of soft iron or other material be attached to a magnet the magnet will lose its power, and the iron will fall to the ground.

Adjourned until Thursday evening, January 24, 1861. Subject, "Projectiles for rifles and rifled cannons."

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
January 24, 1861.

Prof. Mason in the chair.

Mr. John Brown proposed the subject of "Fuel" for future consideration.

Mr. Garvey proposed the subject of the "Theory of language."

Dr. Van der Weyde presented a new pyrometer, which he stated could be used as a pressure gauge. He exhibited another apparatus which showed the connexion between pressure and temperature. Temperature, he stated, could not be raised without raising the pressure. He also exhibited the following table of temperatures, prepared by himself:

TABLE OF TEMPERATURES, BY P. H. VAN DER WEYDE, M. D.

Scales.			Particulars concerning each Temperature.
Centig.	Reamur.	Fahren.	
12,000	9,600	21,632	Formerly supposed by some to be the melting point of: Cerium, chromium, titanium, tungsten.
11,000	8,800	19,832	Platinum, uranium, osmium, iridium.
10,000	8,000	18,032	Molybdenum.
9,000	7,200	16,232	Palladium, manganese, bar-iron, cobalt, nickel.
8,000	6,400	14,432	[These results of old investigations made with Wedgewood's
7,000	5,600	12,632	pyrometer (and reduced by taking each deg. of this instru-
6,000	4,800	10,864	ment = 75° C. about) are still copied by many authors,
5,000	4,000	9,032	notwithstanding they are evidently much too high, like all
4,000	3,200	7,232	old observations above 300° C.]
3,000	2,400	5,432	The highest temperature we can conceive of, exists probably at the centre of the sun.

Scales.			Particulars concerning each Temperature.
Centig.	Reamur.	Fahren.	
2,800	2,240	5,072	After this, the sun's surface, estimated by Newton and Buffon.
2,600	2,080	4,712	Also the interior of the earth, where all rocks, &c., are in a [melted condition.
2,400	1,920	4,352	Melting point of cerium, titanium, tantalum, rhodium, tungsten.
2,200	1,760	3,992B	do chromium, platinum, iridium, osmium.
2,000	1,600	3,632	do palladium, uranium, molybdenum.
1,900	1,520	3,452	do manganese.
1,800	1,440	3,272	do cobalt.
1,700	1,360	3,092	Boiling point of tin.
1,600	1,280	2,912C	do pure bar iron. of nickel.
1,500	1,200	2,732	Dazzling white heat.
1,450	1,160	2,642	Melting point of compound of iron, carbon and nitrogen (steel).
1,400	1,120	2,552	Bright ignition.
1,350	1,080	2,462	Melt point of bright iron, more carbon, and nitro'n (cast-steel)
1,300	1,040	2,372	White heat.
1,250	1,000	2,282	Melting point of pure gold, white cast-iron or iron, more car-
1,200	960	2,192	[bon, and very little or no nitrogen.
1,150	920	2,102	do white alloy of gold and copper.
1,100	880	2,012	do white iron, still more carbon, and various
1,050	840	1,922	[small quantities of other subs. (grey cast-iron.)
1,000	800	1,832	Melting point of pure silver. Ignition of aluminium.
950	760	1,742	do copper, black cast-iron.
900	720	1,652D	do common brass, bronze, glucinum.
850	680	1,562	do aluminium. Bright yellowish red heat.
800	640	1,472	Full red heat.
750	600	1,382	Melting point of magnesium.
700	560	1,292	Cherry red.
650	520	1,202	Dull redness.
600	480	1,112	Red heat, just visible by daylight.
550	440	1,022E	Incipient redness, scarcely visible by daylight.
500	400	932	Incipient redness, only visible in the dark.
475	380	887	Melting point of barium.
450	360	842	Boiling point of sulphur.
425	340	797	Melting point of antimony. Volatilization of cadmium.
400	320	752	do tellurium.
375	300	707	do zinc.
350	280	662	Boiling point of mercury, whale oil.
325	260	617	Melting point of lead, cadmium; boiling point of sulphuric acid.
300	240	572	do amber; boiling point of linseed oil, phosphorus.
290	232	554	Deep blue film produced by tempering steel for watchsprings.
280	224	536	Blue film produced by tempering steel for swords.
270	216	518	Pink film produced by tempering steel for knives.
265	212	509	Steam heated to an expansive force of 50 atmospheres.
260	208	500F	Melting point of bismuth. Steam, &c., 45 atmospheres.
255	204	491	Steam heated to an expansive force of 42 atmospheres.
250	200	482	Brown yellow film on steel for tempering penknives. Steam heated to an expansive force of 39 atmospheres.
240	192	464	Steam at pressure of 34 atmospheres.
230	184	446	Yellow film for temp'ng chisels. Steam at pressure of 29 atmos.
220	176	428	Melting point of tin. Steam at pressure of 24 atmospheres.
210	168	410	Straw color for temp'g razors. Steam at pressure of 20 atmos.
200	160	392	Melting p. of 8 tin, 1 bismuth. Steam at pressure of 16 atmos.
195	156	383	Very pale straw yellow for tempering tools for metal.
190	152	374	Melting point of lithium. Steam at pressure of 13 atmos.
185	148	365	Boiling point of oxalic ether.
180	144	356	Boiling p. of sol. of nit. amm. Steam at pressure of 10 atmos.
175	140	347	Melting point of camphor.
170	136	338	do 3 tin, 1 lead. Steam at pressure of 8 atmos.
165	132	329	do 3 tin, 2 lead.
160	128	320	Boiling point of naphtha. Sulphur ignit. Steam, &c., 6 atmos.
155	124	311	do turpentine or sol. of nitrate of lime.
150	120	302	do chloride of calcium. Steam at pres. of 4 atmos.
145	116	293	Temp'ture at which India rubber and gutta percha vulcanizes.
140	112	284	Melting point of 1 part bismuth and 1 part tin.
135	108	275	Steam with an expansive force of 3 atmospheres.
130	104	266G	Boiling point of amylic alcohol. Solution of carb. of potash.
125	100	257	Melting point of alloy of 5 parts bismuth, 4 tin and 1 lead.
120	96	248	Steam with an expansive force of 2 atmospheres.
115	92	239	Melting point of etherin. Boiling point of nitric acid.
110	88	230	do sulphur. Boiling point of hydrochloric acid.

Scales. Centig.	Reamur.	Fahren.	Particulars concerning each Temperature.
105	84	221	Melting point of iodine. Boiling point of naphtha.
100	80	212H	do inuline. Boiling p. of water and chlor. amyle.
95	76	203	do alloy of 4 parts bismuth, 1 tin and 1 lead.
90	72	194	do sodium, elaidine.
85	68	185	do 4 parts of bismuth, 1 tin, 1 lead and $\frac{1}{2}$ mercury.
80	64	176	do naphthaline. Boiling point of benzine, alcohol.
75	60	167	do 5 parts bismuth, 2 tin, 3 lead and 1 mercury.
70	56	158	do stearic acid, white wax. do 2 parts cadmium, 2 tin, 4 lead and 8 bismuth.
65	52	149	do common wax. Boiling point of bromine and chloroform.
60	48	140	do camphoric ac. Boiling point of chlor. of silicon.
55	44	131	do potassium, spermaceti. Boiling point of acetone, comm. amm.
50	40	122K	Greatest heat of the atmosphere observed at the equator.
45	36	113	Melting point of phosphorus. Boiling point of sulphide of carbon.
40	32	104	Temperature of the blood of mammifers and birds.
35	28	95	Melting point of lard. Boiling point of ether.
30	24	86	Melting point of butter. Acetous fermentation.
25	20	77	Temperature of the blood of large fishes, as sharks, &c.
20	16	68	Phosphorus ignites; aldehyde boils. Vinous fermentation.
15	12	59	Melting point of compound of 1 part sulphur and 4 phosphorus.
10	8	50	Freezing point of anise oil. Boiling point of chloride of ethyle.
5	4	41	Melting point of triyl (Faraday's bicarburet of hydrogen.)
+3 4-5	+3	+38 4-5	Greatest density of water.
0	0	+32	Melting point of ice.
—5	—4	+23	Freezing point of seawater, wine.
—10	—8	+14	do turpentine. Boiling point of sulphurous acid.
—15	—12	+5	do hydrocyanic acid. [and 1 snow.
—17 7-9	—14 2-8	0	do pure sulphuric acid. Mixture of 1 part salt
—20	—16	—4	do linseed oil; brandy; bromine; solution of common salt.
—25	—20	—13	do castor oil. Boiling point of cyanogen.
—30	—24	—22	do common sulphuric acid.
—35	—28	—31	do common nitric acid, cyanogen. Boiling point
—40	—32	—40	do mercury. [of fluid amm. gas.
—45	—36	—49	do liquid ammonia.
—50	—40	—58	do strong nitric acid. Boiling point of arsenide
—55	—44	—67	do solution of tartrate of soda. [of hydrogen.
—60	—48	—76N	Greatest cold of the atmosphere observed near the poles.
—65	—52	—85	Temperature of the planetary space, after Fourier.
—70	—56	—94	Boiling point of sulphide of hydrogen.
—75	—60	—103	Temperature of sulphurous acid.
—80	—64	—112	Boiling point of carbonic acid, hydrochloric acid.
—85	—68	—121	Freezing point of carbonic acid.
—90	—72	—130	Boiling point of protoxide of nitrogen.
—95	—76	—139	Mixture of solid carbonic acid and ether.
—100	—80	—148	Freezing point of protoxide of nitrogen.
—110	—88	—166	Mixture in vacuo of solid carbonic acid and ether.
—120	—96	—184	Mixture of solid protoxide of nitrogen, solid carbonic acid and
—130	—104	—202	ether; alcohol exposed to this cold becomes thick as castoroil.
—140	—112	—220O	The former mixed in vacuo with sulphide of carbon.
—160	—128	—256	Temperature of the planetary space, after Pouillet.
—180	—144	—292	Temperature at which the volume of gases would be condensed to nothing, if they followed the same law for all lower temperatures, namely contracting for every degree Cent. one 273d part of their volume at 0°. [This temperature was therefore adopted by Clement and Desormes as the point of absolute cold; however gases liquefy and solidify before reaching this point, and the day may be near that even hydrogen will be condensed to a metallic state, which is evidently its nature.]
—200	—160	—328	
—225	—180	—373	
—250	—200	—418	
—275	—220	—463P	

The temperatures above A are probably impossible; those from A to B and from O to P are hypothetical temperatures; from B to C and N to O are artificial temperatures, produced only in the chemists laboratory; from C to D is the most powerful blast-furnace temperature; and from D to E the heat of a common blast-furnace, or of one with a good draft; from this point to F is the heat of most common flames without draft or blowing; however to produce this temperature on a large scale, a draft is necessary to supply the required amount of air; also for the next range from F to G, representing high pressure, and to H, low pressure steam. From H to K is the chemist's water-bath, and finally from K to N the range of atmospherical temperature on our planet.

Mr. Garvey exhibited a new kind of refrigerator, the construction of which, was very simple. It consisted of three boxes inside of one another, with a space of only three-fourths of an inch between each box. leaving a layer of cold dry air between the outer and middle box, and charcoal between the middle and inner one, with ice in the centre. It had a tube over the ice, through which the air passed in, and went out at the other side. It contained a fan wheel, which is worked by a kind of clock-work inside, and thus a current of air is kept up for a period of thirty hours. It also possessed an advantage which was very useful to farmers, which was, that it could be used without any ice. He believed it would prove a very successful article. Mr. Wm. Symms, of Ohio, he stated, was the inventor of it.

The Chairman.—Do you think it can be used successfully without ice?

Mr. Garvey.—I do.

The Chairman asked why people placed their provisions in wells to preserve them?

Mr. Garvey said it was on account both of the low pressure and the occasional presence of carbonic acid.

T. D. Stetson said that carbonic acid does not collect in wells that are constantly used. He stated that simply drawing up a pail of water two or three times and throwing it down the well again would make any well healthy enough for a person to go down with perfect safety; also, that if a well is left idle for a length of time the carbonic acid may collect in such a quantity that it will cause it to be fatal.

Mr. Garvey.—In wells which have not been used for a length of time it would be better not to go down into them. If it is a deep well it may take months to get the carbonic acid out of it. Unless a lamp let down lighted into a well would continue burning for a length of time I would not let a man go down into it. I am in favor of agitating a well in the manner described by Mr. Stetson, and then letting down a burning candle.

Mr. Seely said that carbonic acid was one and a half times heavier than air, and that it generates in wells. He saw a well in Saratoga county in which carbonic acid had generated. If two gases are brought in contact with one another they will mingle together.

Mr. Garvey stated that it was dangerous to keep at a given altitude in brass factories. He had seen it absolutely necessary

in foundries to arrange a mode of getting rid of the carbonic acid.

PROJECTILES.

T. D. Stetson.—The rifling of small arms was so great that shooting from smooth bores was an almost obsolete idea, but rifling cannons was only in its infancy. An estimate had been made in England that every discharge of the famous Lancaster gun against the Russians cost $500, or £100, including, of course, the cost of the experiments in the attempt to perfect it. The finishing of the ball by Whitworth's process is very beautiful, but very expensive. He cuts the gun into a six or eight sided bore, and fits the ball to it by accurate finishing of each. The firing of rough shot in a rifled cannon is destructive. He considered the Whitworth the type of perfection, but too expensive for general service. One of the substitutes successfully adopted is the banding of the ball with lead. One officer of the U. S. Army has patented a mode by which wrought iron is bound around the ball. A wrought iron surface would be nearly as destructive as the cast shot, but in this invention grease and leather is also used. He reviewed the history of rifled projectiles from the round ball down to the latest Minnie. A round ball was the least liable to get out of order, and required the least skill. A ball pointed at each end is the most scientific form, but this form of ball is objectionable. The ball hollowed out and chambered at its back or rear end, so as to allow the powder to go inside and expand the metal, causes the ball to spread, and thus to fill the bore and rifle grooves very perfectly. All these are lead balls for small arms. Rifled cannon is yet in a transition state. There has been a number of cannon rifled by our government. The late Secretary Floyd has paid $80 for rifling them. He thought they could be done as well at a profit for $10.

The chairman disagreed with Mr. Stetson. He thought it would cost $80 each to rifle cannon well.

Mr. Stetson.—All rifle projectiles are longer than the diameter. A rifle cannon projectile for a 6 pound gun will weigh about 14 pounds. The style in which our Government rifling has been done is not the best. They have rifled them as little as possible, just as the seceding States have seceded as little as they could. He exhibited a ball weighing five pounds designed for a two pound gun. It was a cast iron ball, belted with lead. All balls thus belted are so contrived that by some means the lead is ex-

panded at the moment of the discharge. In all such balls the lead is flush with the surface of the casting, and fits easily within the cylindrical part of the bore when the ball is introduced into the gun. This leaves the grooves entirely open, so that the force of the discharging gas might escape through them, and thus produce little effect on the ball; but by the expansion of the lead into the grooves at the moment the powder is ignited the passage of the explosive gases past the ball is effectually prevented, and the ball is compelled to twist with a velocity corresponding to the twist with which the ordnance was rifled.

An inventor in Alabama, John B. Read, had patented one mode of effecting this, which he (Mr. Stetson,) proceeded to delineate on the black board, and though by no means the first, it was a good specimen of that principle. The lead in this, and all similar projectiles was expanded to the pressure of the explosive gas which was allowed to enter between the balls and the cast iron body of the shot, and thus to spread it outwards with great force. A serious objection to all cannon balls used on this principle was the flying of the lead so soon as the ball passed the muzzle. In some experiments by General James, in Rhode Island, last summer, the fragments of the lead belts were reported to have nearly destroyed a board fence situated at a considerable angle from the line of firing. This makes such balls very objectionable for ordinary field practice, as they might prove in many emergencies more destructive to advanced parties or charging columns of their own troops than to the enemy.

He showed a large sectional drawing of the ball which he considered far preferable to any other yet made public. It was patented by B. B. Hotchkiss, Sharon, Connecticut, and had been extensively and very successfully tested, both by the inventor and the United States officers. He exhibited several diagrams of targets, in one of which 90 per cent of the balls hit the target, 7 feet four inches, by 5 feet 8, at a distance of a mile. The U. S. Government had sent 200 of these balls with the howitzer battery presented to the Japanese Government, preferring these above all other patented projectiles.

The ball is, properly speaking, in three parts—the point or body, and cap or rear piece, and the belt. The two former are of cast iron, the latter of lead; or of lead slightly hardened, or of an alloy but little harder than lead. The cap is driven lightly upon the shot, and cuts slightly into the lead when the shot is

introduced into the gun. At the moment of discharge the cap is driven home on the body of the shot with great violence, and forces out the lead to a sufficient extent to tightly fill all the grooves. Any excess of pressure above that desired is prevented by the contact of the cap with the cast iron body of the shot. The most approved form of this shot makes the lead belt very narrow. The specimen ball exhibited, which was 2½ inches in diameter, and 5¼ inches long, was encircled by a lead belt only five-eighths of an inch wide and one-quarter inch thick. The ball is supported in the gun, not on this belt alone, but by it and by a nicely turned ring or surface of a proper diameter at the extreme rear. A small quantity of tallow or other grease was placed in front of the lead belt so that the compression of the lead forced out the grease in front. Lead alone is of a greasy character, but it was preferable to lubricate slightly.

There was, he said, even in this ball, a strong disposition of the lead to fly off or separate from the iron, but the force was slight in comparison with the other mode of expansion. The centrifugal force due to the rapid rotation was the only force to be resisted in this case. To insure against this Mr. Hotchkiss made his lead rings thus narrow, and also constructed his iron parts in such form that they hooked on, and thus aided to confine both the front and rear edge of the belt. If this bullet was cut into many pieces or segments the fragments would probably all be retained.

The inertia of the ball in any heavy rifled ordnance offered great resistance to the rotary or twisting motion, and there was always a risk that the lead belt would twist about on the iron without imparting a proper rotary motion to the iron body. To avoid this various means had been devised. One inventor had caused his belts to jog or notch into the iron at intervals on the front and rear edges. Another had made deep undulations in the iron under the belt. By either of these means the lead could obtain a very firm grasp on the iron.

Visitor.—Has the Hotchkiss ball a superiority over all others?

Mr. Stetson thought it had.

Visitor.—Is it used only for cannon?

Mr. Stetson.—Yes. I think the practice of the United States Government of rifling ordinary cannon which were less strong than cannon should be for such purpose, would cause hollow shot to be used generally in such instead of solid balls.

Chairman.—Is there any gentleman present who can give us the origin of rifling?

A gentleman said it could be found in the history of Chinese antiquities.

The Chairman alluded to the ancient mode of projecting things by the Greeks and Romans.

Mr. Garvey remarked that in the instance of David killing Goliath there must have been a rifling motion given to the stone. He explained the motion of rifling which was given to the Armstrong gun. At the breech it occupies one position, and when discharged it occupies another. He also explained very fully the theory by which rifled guns shoot more accurately than smooth bored pieces. It is the corkscrew motion given to the ball which causes its accuracy of aim. He thought that anything that employed lead in rifling should not be used much. He wondered at artillery being used as now constructed, as after a few shots were fired the guns became dangerous to those using them. He would advise artillery men to fire away their cannon and keep the ramrod. That is, to use a solid bar of metal for a gun and tubes for projectiles. This is a form of gun he himself had devised. He also stated that it required a good deal of force to give the rifling motion to a ball while inside the gun, but it required a very small force to keep up that motion after it had left the gun.

Mr. Haskell.—Frederick Newbury, of Albany, has patented a ball which consists of two balls together with an oil patch between. All that is intended to come in contact with the rifle is the patch, the lead not coming in contact with it at all.

Chairman.—What are the balls made of?

Mr. Haskell.—They are made of lead.

Mr. Stetson.—The expansive force of burning gunpowder has been judged from some experiments to be so great as 200,000 lbs. to the square inch. But this only obtains when it is absolutely confined. In practice, the force by a ball in a rifled or other arm cannot be assumed to be nearly as great. The velocity of a projectile is capable of approximate measurement. He (Mr. Stetson), had timed the velocity of one of Hotchkiss' balls on the day of the trial before the Mexican officers at Flushing, in 1859, and found the ball occupied seventeen seconds in flying about four miles.

The Chairman.—Why do you use a long ball with a flat end?

Mr. Stetson.—Because the resistance of the air is less. A

thing spinning around its axis tends to keep its position, without that motion it tends to deviate from its course. The effect of feathering an arrow is to keep the end back and the point forward. An Illinois man patented a ball with grooved sides to act on the air. The twisting of the ball should be caused before it leaves the gun, and not after it. It is not possible in practice to make the centre of mass and the centre of gravity coincide. He thought it might be advisable to twist the ball only once in a hundred feet.

Dr. Vander Weyde said that the fact of all revolving bodies holding their axial positions with the same force with which they moved in a straight line, was originated by Isaac Newton.

The Chairman referred to a gun once tested by the Government which requires three charges of powder. He wished to know the inventor.

Mr. Seely said it was a Mr. Haskell.

The Chairman.—Is there anything gained by the powder reaching the ball in three successive discharges?

Mr. Garvey thought there was a decided loss. The first charge is fired, and the gas is in a state of undulation, and what will be the result of these successive undulations when the gas generated coincide?

Mr. Haskell said there was a difficulty in having guns too long. He thought a barrel of two feet long would answer all purposes.

Mr. Johnson said that the best kind of guns made in this country were made with a three hours fusion, (i. e., the iron kept in the fusion state for three hours before casting.)

Adjourned to Thursday evening next, January 31st, 1861, at 7 o'clock, when the subject of "Fuel" will be discussed.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
January 31, 1861.

Mr. Wm. Lawton in the chair.

Mr. Bruce read the following paper on projectiles:

I will now proceed to give a description of two projectiles which I deem of a terrific character, with the construction of which I was somewhat connected.

The first was a bomb invented by my son, Wm. D. Bruce. It consisted of a shell of cast iron of any desired thickness, suspended in the centre of which was another shell of about a third

the size of the one containing it, and was held in position by 12 or more gun barrels that projected through openings of the exterior shell and even with its surface.

The interior shell was designed to be filled with common powder. Intermediate between the two shells was to be filled with what is termed unextinguishable fire. The gun barrels were to be all loaded to the muzzle, other apertures were left in the exterior shell sufficient in number to permit the escape of the unextinguishable fire. The opinion entertained of the destructive qualities of the shell may be easily imagined on learning that if fired from a fort, or ship on another ship, if it but partially embedded itself in the ships side the unextinguishable fire would immediately set the ship on fire with no hope of extinguishment, till the material contained in the shell was exhausted, and reaching the interior shell the whole would burst and tear the ship's side in pieces.

If the shell penetrated the ship's side, remaining between decks, or on the spar deck, it would set fire to everything combustible it came in contact with; all attempts to remove it would be certain death to those making the effort, as the gun barrels would be at slight intervals discharging their contents, thus barring all approach. In 1847 I took this shell to the War Department at Washington for the adoption of the Government, but the Secretary at War although highly pleased with the ingenuity displayed in it's construction, was averse to adopt it deeming it too dangerous to handle by any but the most careful persons. The second projectile in which I was concerned was during the war between England and France against Russia, and was the joint production of my son-in-law and myself, and was designed and termed by us the Peace Maker, considering the effects to be produced by it so destructive in their character that if as successful as we predicted it would be, its tendency would be to reduce all future causes of war to be settled by diplomacy.

The description of the Peace Maker is as follows: A boat, or vessel of the required size to be made of boiler iron somewhat flat bottomed, but with a deep keel and very sharp at the stem, decked all over, with a small hatch amidships to shut perfectly tight. The hold of this vessel to be filled with powder and such other destructive material as may be thought advisable. Through the stem was to project a pin to the interior end of which was to be a box of percussion powder. This vessel was to be propelled

by a relay of rockets of suitable size pointing aft to give to the vessel the appropriate velocity.

As soon as one rocket was exhausted it set fire to the next, and so on until the object was reached to which the stem of the vessel was directed, being first struck by the pin before mentioned, which communicating with the percussion powder and that with the cargo of combustibles, exploding the whole under the ship's counter, while the force of the vessel striking would have fearfully shattered at first, rendering instant and inevitable destruction to the ship and all on board. The object of the deep keel was to guide the *Peace maker* in the one undeviating course to the object aimed at. I tried the experiment with a tin model of five feet long in Wallabout bay, setting fire to the rocket myself; on the instant it sped off with a velocity far beyond my expecta-. Although I deemed my first experiment a perfect success so far as I had attempted it, but I learned the fact that the rockets, the propelling power, would necessarily have to be so graduated to the resistance to be overcome and the velocity thereby be so regulated that the vessel in a rough sea would not by her too great speed bury herself in the waves.

Before I was prepared to try another experiment the news of peace between the Allies and Russians arrived that put an end to any further trial on my part. Still I think this description of vessel, without its cargo of destructibles, might be made available in saving life from wrecked vessels, by carrying one or more lines from shore to a wreck when the ocean was so tempestuous that no boat from the shore could live to reach her, and thus be the means of saving many valuable lives that might otherwise perish.

Mr. Seely.—In one of your plans you require an inextinguishable fire. Have you found it?

Mr. Bruce replied that he had.

Mr. Churchill inquired whether malleable iron prepared with zinc afforded a protection against rust?

Mr. Johnson stated that he had heard of metal having been prepared in such a manner, but not to any great extent. He did not think it was very successful.

Mr. Selleck believed it was made by using red oxyde.

Mr. Dibben said that zinc did not go into any union with the iron. He thought Mr. Selleck's statement was doubtful. Their theory is that when the zinc takes the carbonate from the iron

it becomes a metal then. The oxyde of zinc has no reason to have a greater affinity than the oxyde of iron has. The hotter you make your bath of iron the quicker you will decarbonize it.

Mr. F. Fleury said that he had seen some experiments made with the oxyde of zinc, and he found that there was a great benefit to be attained by using a portion of franklinite ore. He had also used electricity with advantage.

Mr. Seely.—The decarbonizing is always effected by oxygen. It is easy to infer that the oxyde of zinc will sooner give up its oxygen to the iron than the oxygen of the air will.

Mr. Fleury.—Zinc is volatile at a temperature before iron melts. Iron, I think, becomes purer by the presence of oxyde of zinc. Electricity not only purifies the iron, but has a tendency to give it different properties. I found by using a current of electricity, that I was able to make malleable iron from cast iron. Every thing that is fibrous contains nitrogen. It is now thought that nitrogen is to be found in iron. I have taken a thousand pounds of scraps of old cast iron, and have made 920 pounds of good malleable iron from it. Only about five per cent. of salt is used. Ammonia costs very little, and the cost of nitric and sulphuric acids is very small. Nearly all malleable metals contain zinc. He stated that he had manufactured $60 worth of nails from $10 worth of this old cast iron.

R. L. Pell.—Do you believe that electricity is contained in the whole wire, or only in a part of it?

Mr. Fleury said that it was to be found in the whole of it.

Mr. Selleck inquired if it could be worked from a puddle ball into an iron plate with one heat?

Mr. Fleury said it was done with one heat. He saved one heat.

Mr. Pell.—The more negative a metal is, the more affinity it has for combining oxygen in it.

Mr. Johnson inquired if Mr. Fleury had found any difference between the scrap iron and the pig iron?

Mr. Fleury said that the scrap iron was the best for many reasons.

The question being brought up, of making steel plates for ships,

Mr. Selleck exhibited several plates of iron covered with a coating of Franklinite iron on the surface. Plates so covered do not rust. He stated that he had a patent for coating iron in this manner.

Mr. Pell asked if any gentleman present could state whether iron contained electricity all through it, or only on the surface? He thought that all iron contained electricity to repletion.

Mr. Hedrick said that the wire was affected with electricity through the whole surface, with the exception that one end contained the negative and the other the positive electricity.

Dr. Knight.—Some few years ago some experiments had been made, and it was found that the iron was given polarity throughout it. He thought that electricity was to be found all through the wire, and not on the surface only.

Mr. Garvey said that percussion on a bar of iron would crystalize it. One phase of the vibration will be positive electricity and the other negative.

FUEL.

Mr. Hedrick.—The fuel question is a very large and a very material one. As a material question, it is hardly second to any that we will come across. The primitive fuel was wood, and all other fuel that has been used up to the present time has been similar. Carbon is the main thing in the wood. What we call charcoal is carbon. Fuel is merely heat stored up, and when burning it we are only bringing it out. You may say that the coal is the fuel and the oxygen the supporter of combustion, or that the oxygen is the fuel and the coal the supporter of the combustion. Either is correct. The fact is, that for every pound of oxygen that enters into the fuel, it will raise twenty-nine pounds of water from 32 deg. to 212 deg., making a difference of 180 deg. No fuel is pure. Wood is not pure. The earthy matter which all fuel contains is incombustible, and takes away from the heat, because it has to be heated up. For making steam, one fuel is as good as another, if it contains as much combustible. In this country the question of fuel for ships was considered by Walter R. Johnson. When we burn hydrogen in oxygen, water is the product. You can produce a very high heat by the oxohydrogen blowpipe. Pure carbon and pure oxygen make the the best heat. Air contains, besides oxygen, four-fifths of nitrogen. In the making of steam we can always get the whole of the heat. The cheapest mode of warming is by steam. If you reduce wood to powder, you cannot burn it. You cannot burn lampblack, and it is only fine charcoal. The reason is, that the quantity of combustible heat at one part is so small that it cannot

heat the parts around it sufficiently to cause ignition. The chemical equivalents of wood are, carbon twelve parts, hydrogen eight, and oxygen eight. I think green wood is better for fuel than dry, because the water in the wood is diffused through the room in the shape of steam.

Mr. Seeley.—Mr. Hedrick has given a very full description of this subject. The amount of heat produced is according to the quantity of oxygen consumed, but the practical value of the heat is not so equally proportioned. Carbonic acid burned into carbonic oxyde will not produce as much heat as carbonic oxyde burned into carbonic acid. The intensity of heat is dependent on the amount of oxygen consumed in a given space. If we burn a pound of charcoal in a minute, we shall get twice the intensity as if we burned it in two minutes. Crystalized carbon is one of the greatest experiments of the age. We can construct vessels that will contain 200 atmospheres. If carbon is fusible at all it can be fused. If we could burn earth, we would have a precious stone. Water contains the elements of combustion—hydrogen and oxygen. Water may be decomposed.

Mr. Garvey.—Instances have been known of cotton mills in England being burnt by small particles of burning cotton floating in the breeze and setting fire to the surrounding parts. The highest compressing force he had ever used above temperature, was fifteen pounds to the square inch.

Dr. Vander Weyde made some experiments with a lamp, and stated that there was a certain quantity of air required to burn gas with advantage. The more air at the metre the stronger will be the heat.

Mr. Fleury.—Hydrogen gives a larger amount of heat than carbon. Tar oil can be bought for six cents a gallon.

Adjourned until Wednesday evening next, February 6th, 1861, at seven o'clock. Subject of "Fuel" continued.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
February 6, 1861.

Mr. John Johnson in the chair.

Mr. Laman made some remarks on the relative merits of the Armstrong and Whitworth guns, and also of a gun of which he was the inventor. With respect to the Armstrong and Whitworth guns, he said: An Armstrong gun has thrown a 32 pound

shot five miles and over, which was never surpassed until Mr. Whitworth threw a shot five and a half miles. The last gun made by Sir William Armstrong, and sent to be tried, was a 12 pounder. At seven degrees elevation in five rounds fired, the range was from 2,465 to 2,495 yards, the difference in range being 65 yards, and the greatest difference in width three yards. With these may be compared the practice with a Whitworth of the same calibre (12 pounder,) fired at the same elevation (seven degrees,) on February 1st. The range was from 3,078 yards to 3,107 yards, the difference in range being 29 yards, the greatest difference in width one and two-third yards.

The range of the Whitworth at seven degrees, (2,495 yards,) by 712 yards, it, in fact, exceeded the range obtained by the latter gun at eight degrees, and even nine degrees, and was therefore not fixed at eight degrees or nine degrees. The shooting of the Whitworth 80 pounder, at seven degrees, appears to have been still more accurate; the range attained was about two miles, and three out of four shots fell in an area of 16 yards long, by one foot wide. This comparison at seven degrees is sufficient to show that in precision, as well as in range, the Whitworth has proved itself the superior gun. I find by Robbins on gunnery, that gunpowder has a speed of 7000 feet a second.

Mr. Dibben thought Mr. Laman's estimate of the speed of gunpowder very low, not one-tenth.

Mr. Laman.—The range of a 10 inch columbiad, with an accelerator, on a barbette carriage, at an elevation of five degrees, is 1,814 yards; at an elevation of 10 degrees, 2,777 yards; at 20 degrees elevation, 4,020 yards. The quantity of powder used in those discharges was 18 pounds, and the projectile weighed 128 pounds. I have not received any assistance from Secretary Floyd for the purpose of testing the merits of my gun, but am endeavoring to get it from the governments of France and England.

Mr. Babcock.—I think the reason that Mr. Laman has not received the necessary assistance for making experiments with his gun, is that Secretary Floyd has expended very large sums on General James' gun. The shot used with Gen. James' gun are 7 inch shot, and cost $50 each. From all I have heard of this gun, I believe it fires at an angle of 60 deg. from the muzzle of the gun. About a fortnight, one shot fired from one of those guns, went a quarter of a mile out of its range, and he offered a reward for the recovery of the shot.

Mr. Laman.—The larger the gun the more need there was of an accelerator.

Mr. Hamaker, of Lancaster, Pa., presented a new mode of balancing mill wheels, and said, this is a new mode of applying the the balance to a millstone to get it to a perfect balance, both in running and standing. The way of balancing mills heretofore was by balancing lead on the top of the stone, which I find was not the proper way. Nine out of ten when suspended, are out of balance, and the balance is generally below the suspension line. By my mode of balancing, the balance can be made both running and standing. The balance should be applied directly in a level with the heavy portion of the stone. I have applied it to about eighteen mills in Lancaster, Pa., and to three in Philadelphia. D. Fellenhamer is the patentee, and took out his patent on February 4, 1860.

Mr. Dibben said the only difference from the old way was that the weight was placed at the bottom instead of the top, as in the old plan.

Dr. Vander Weyde.—At the last meeting we had the subject of projectiles. Experiments have been tried in Germany to find the effect of a ball in its rotation. Balls rotate on the centre of gravity. If a ball is so placed in a gun that the left side is the centre of gravity, the effect will be that the ball will deviate towards that side. If so placed that the centre of gravity be on the right side, then it will deviate towards that side. If the centre of gravity be placed on the top, it will go farther than if it was on the centre. Every ball will rotate round its shortest axis. The tendency to rotate round the shortest axis, will make it rotate against gravitation. He tried an experiment with a glass globe containing mercury and wine. The mercury being the heaviest, kept next the glass, the wine remained in the centre, and the bottom was free from both. He made other experiments with rings and a chain, for the purpose of showing that everything rotated round its shortest axis.

FUEL.

Dr. Stevens.—In the discussion the last evening the question was asked why the small particles of coal did not burn. I think the reason is that a sufficient quantity of atmospheric air is not furnished to the stove. A gentleman of Boston, has invented a plan by which a sufficient quantity of hot air is furnished.

The anthracite coal is piled up in the Lehigh and Schuylkill regions, mountains high. In the Lackawanna district, it is piled up in the same manner. A plan has been adopted of mixing fine coal with clay and making bricks of it.

Mr. Vander Weyde.—All the coal in Germany is found in a powdered state, and blacksmiths before using it, have to put water on it for the purpose of solidifying it. You very seldom find it in lumps, and it is not very useful for gas.

Mr. Latson.—One objection to the soft coal of this country is that it is overcharged with sulphur, thus destroying the grate and bars. I was the first man who ever burnt anthracite coal to smelt iron with. I have owned the Yellow Springs, in Pennsylvania.

Mr. Hedrick said that in burning fine coal he thought they had too much air instead of too little. He suggested that bituminous powder might be mixed with anthracite coal and then be burned.

Mr. Latson said that could not be done.

Dr. Vander Weyde.—If you use lumps of coal large enough to let the air pass freely through them, they will burn well. If you take fine coal and use it without being wetted, it will not burn, but if you wet it it will.

Mr. Latson.—I have found that Lehigh and red ash coal produces a very good fire.

Mr. Dibben.—There is a great difference in anthracite coal. If you have the right kind of a grate and the right kind of a blower, you don't want a better coal than the finest coal. A friend of mine uses fine coal every day in his office which costs only $1 a ton, and it gives a beautiful fire, but has to be set going with other coal, and to have a good blower. If the blower be taken down it goes out in a few minutes.

Visitor.—Do you burn with grate bars or perforated bars?

Mr. Dibben.—With grate bars.

Visitor.—How about the quantity?

Mr. Dibben.—A ton of fine coal will give as much heat and last as long as a ton of large coal. If you get 2,000 deg. temperatures of fire heat, and boiler heat of 300 deg., then you must conduct accordingly. I think the burning of fine coal will pay as well as the burning of large coal.

Mr. Veeder.—Would not a benefit be derived by introducing the air above and below? I used pea coal successfully some few

years ago in a stove. Keeping the doors open, assists it in burning. Pea coal requires to be burned on a broad surface. My whole bill for coal that winter was $7.50. Pea coal at that time was only $2 per ton, while all other coal was $11 a ton. The only disadvantage in using it is that the ashes may collect at the top and prove a non-conductor. A good draft from the bottom would obviate this.

Mr. Haskell said there was a patent granted in this country for sticking fine coal together with pine pitch and tar.

Mr. Johnson said his brother had burned pea coal under his engine, which was a ten horse power. The cost of the pea coal was only $1.25 a ton, and caused a saving to him of $9 per week.

Mr. Dibben.—I would not recommend fine coal to be brought to sea, as it would occupy too much space, and firemen did not like it either, because it is more difficult to keep the fire going with the fine coal than it is with large coal. When you see the blue flame at the top of the funnel of our anthracite burning boats, then the admission of air at the boiler or any other place, would be an advantage. These boats might burn a great deal less coal if they had more boiler room. Some of the Fall River boats burn nearly forty tons of coal going from here to there.

Mr. Babcock.—Is it going, during the trip there and back, or only going there?

Mr. Dibben.—Only going there.

Mr. Vedder.—They consume on the Hudson river boats about forty tons of coal. They have found a great economy in keeping up a moderate fire and leaving their doors open. I think it would be advisable for the operator to have perfect control over the admission of air; quick combustion is very costly. No material that we consume will let off more smoke than coal oils; but if it is put under a reflector, this is obviated. On the western boats they have coal in such quantities that they consume it very extravagantly, and the great volume of smoke that is continually going off, is composed of small particles of coal. The greatest difficulty consists in the introduction of oxygen.

Dr. Vander Weyde stated that an apparatus has been invented by which the smoke is nearly dispensed with. All smoke is particles of carbon not consumed. If we burn gas we cannot have too much air. The influx of air will not prevent it from burning.

Mr. Garbanati said the people of London had nearly obviated

the smoke by not putting the fresh coal on the top. They put it in at the bottom and then raise it up. They have reconstructed the grates of private houses there so as to enable them to put the coal in at the bottom.

Mr. Seely.—It is stated by good authority that only about five per cent of the heat of the coal is realized. If we only add five per cent additional to the five per cent already attained it will be a great gain. Carbonic acid is the final product of coal. You may so burn your coal that carbonic oxyde will be the final product. The practical difficulty is in getting the air properly mixed. Probably in heating buildings by steam we gain all the advantages that can be attained in heating. There is much loss in furnaces, especially in burning wood. In using a stove with a short pipe about three-fourths of the heat is lost. In all stoves and furnaces for heating buildings, provision should be made for furnishing coal at the bottom.

Mr. Babcock did not think the loss was to be imputed to the combustion of coal.

Dr. Stevens.—The ashes of coal is composed of alumina, potash, iron, &c. Red ash contains more sulphur than white ash. If coal can be consumed at a low degree of heat no clinker will be formed at all. I use in my family a straight cylinder stove, and a sufficient amount of atmospheric air is admitted to burn the gases. I light a fire in my furnace in the fall and expect it will keep burning until it is put out in the spring.

Mr. Hedrick stated that the heat used in the charring of wood is at the expense of the charcoal.

Mr. Vedder inquired whether the introduction of steam had been tried in small quantities, so that the decomposition of the water would increase the fire and create hydrogen, and prove an advantage?

Mr. Hedrick said it could not be done with advantage. He thought as much would be lost as would be gained.

Dr. Vander Weyde did not think there would be anything gained by the introduction of water into the fire.

Mr. Veeder asked Mr. Seely whether heat is the union of hydrogen with the material of flame, or whether it is a union of hydrogen, carbon and oxygen, or a union of hydrogen and carbon?

Mr. Seely said that if two elements were united and separated it would be at the expense of the heat.

Mr. Hedrick inquired which of all the coals could be used with the best advantage.

Mr. Bruce said he had used all manner of coal, from the pea coal up to the Lackawanna, for manufacturing purposes, and he found that the Lackawanna and Lehigh were the best. All the other anthracite coals had a tendency to melt the bars.

Dr. Stevens.—All the various kinds of coal differ very much in the quantity of carbon which they contain. The Lehigh coal will range as high as 95 per cent of carbon. The Lackawanna contains about 75 per cent of carbon. Cumberland coal is semi-anthracite. Broad-top is a semi-bituminous coal, and contains about 65 per cent of anthracite. The Lottsburg coals are semi-bituminous. All these coals lie east of the Allegany mountains. West of them a gassy coal is obtained which is used by the Manhattan Gas Co. We have a coal from Virginia which differs very much from these. Red ash and white ash signifies the amount of iron contained in it. It is the iron that gives it the color. We get from New Brunswick the famous oil coal,—the Albert coal as it is called. The price of the Albert coal is from $14 to $18 a ton. The Lackawanna is furnished here at $3 a ton.

Mr. Hedrick.—Which coal is the hardest to burn?

Dr. Stevens.—The Lehigh is the hardest. You cannot get any coal without sulphur.

Adjourned to Thursday evening next, February 14th, 1861. Subject, "Compressed air, and its use in propulsion."

American Institute, Polytechnic Association,
February 14, 1861.

Prof. Mason in the chair.

PROJECTILES.

Mr. Lewis Masquerier read a paper on "Progressive and Rotary Motion."

Can a rotatory motion have a leverage upon the progressive motion of a bullet or planet, so as to deflect it from a rectilinear into a curvilinear direction?

The aberration of balls fired from a smooth bore ordnance, is said to have suggested the cutting of the spiral grooves in them, by which they invariably receive a rotatory motion, around an axis pointing one of its poles to the mark, and strike with more certainty. If the rotatory motion can have such a deflecting

power upon the progressive motion, the result will be, that projectiles shot from smooth bore pieces will describe circles, instead of straight lines. Whenever the axis of rotation of the ball is horizontal and at right angles to its progressive course, it will strike under the mark, if the rotation in its front is in a downward direction; but if upward it will strike above the mark. If the rotation is around a vertical axis from left to right, it will strike to the left of the mark, and if from right to left, it will strike on the right side of the mark.

I believe, it is laid down, that if a ball or globe could be placed without the influence of any resisting or attracting medium, that its centrifugal force would be equal on all its sides. But, if it has a projectile motion in addition, this force may vary on different sides. When it revolves around a horizontal axis at right angles to the direction of the progressive motion, and downwards, the matter of the ball in front, is carried down more or less, in its rear, upward, underneath, in a contrary direction, and on top in the same direction, more or less to its progressive course. Now, it would seem, that as the momentum of the rotatory motion in one half of the bullet or planet, is, more or less, in the direction of the progressive motion, and the contrary way in the other half, might it not have a leverage and cause a deflection from a right line direction? As two forces from different directions will propel a ball in their averaged direction, why will not the projectile and rotatory forces unite in an averaged direction? The tendency of a balance wheel to revolve after the impulse is withdrawn, and of a globe hung by moveable gudgeons upon the periphery of a large wheel, to revolve in the same direction with the progressive course, seems to be some evidence that the rotatory force has a leverage upon the projectile force.

May not then the aberrations given to projectiles fired from smooth bore pieces be owing more to their globular shape, by which they get a rotary motion, and that by using long cylindrical ones, pointed and hollowed out at the other end may not sharp shooting be attained with the progressive motion only. But if a rotatory motion around an axis pointing to the mark, is absolutely necessary, may not a spirally shaped chamber, behind the ball, give such motion, and thus avoid the great expense of rifling.

Though some of the conditions in which the planets exist, may be different from that of our projectiles, yet I do not see but that

the effect of the rotatory motion upon the projectile may be the same, and thus cause the circularity of their orbits. Now have we not a little clearer perception, how a rotatory force can deflect a planet into a curvilinear orbit than an attractive force can? But both forces may act together and assist each other.

But may not this same rotatory force throw out the waters of the ocean, on the conjunction and opposition sides of the earth, and be a cause also of the tides, which, being impeded by the continents, may be the cause again of their happening at every position of the sun and moon.

Mr. Dibben said that there was no such leverage in rotary motion. The rotary motion of globular balls is caused simply by the eccentricity of the center of gravity.

The President inquired whether a cannon ball was ever made without this eccentricity.

Mr. Dibben said that Mr. Hotchkiss had a method of centering his ball to accomplish that result. It is easy to determine upon which side of a round ball is its center of gravity, by immersing it in mercury.

Mr. Parkhurst said that, according to the law illustrated last week, there is a tendency in the lengthened ball for rifled cannon to take the shortest axis of rotation, and showed by experiment that a model of these balls would thus change its axis of rotation, even in opposition to the force of gravitation. In practice, however, this tendency may be overcome if the rotary motion is not too rapid, by placing the center of gravity forward of the center of the mass, or by the feathering of the rear of the ball from the action of the expanding gases upon the leaden belt, so that the atmospheric resistance shall counterbance the lateral centrifugal force, the progressive momentum will tend very much to retard the change of axis.

THE WEIGHT OF THE ATMOSPHERE.

Dr. Vander Weyde exhibited a new process for weighing the atmosphere. In the common method, the air is not directly weighed, for when we weigh the flask containing the air, we do not weigh the air in it. We first weigh the flask by itself, and then the flask minus the amount of air abstracted from it; and it is very difficult to determine precisely how much air is abstracted, because we cannot easily make the vacuum perfect. The new method reverses the process. A flask being made suffi-

ciently strong, air is compressed into it, and the weight of that additional air is ascertained. A single stroke of the piston was sufficient to increase the weight of the apparatus, the whole being weighed together by two grains, which turned the scale very perceptibly. After four strokes, the air was measured by discharging it into a glass receiver filled with water, when it displaced about one pound of the water. The weight of the atmosphere is thus ascertained to be about 1-800th part the weight of water, varying as the barometer varies.

FUEL.

Mr. R. L. Pell being called upon to open the subject, remarked:

The most ancient fuel was wood. It makes a cheerful fire from its bright flame, but is expensive from the fact that it requires frequent renewing, and much room to store it in.

Wood consists in longitudinal fibers as fine as hair, the interstices between which is filled with cellular tissue, varying with different species, and is composed of carbon, hydrogen and oxygen, which, when decomposed by burning, are separated from each other, and reunited in other proportions, and these constitute the products of combustion.

When we place wood on the fire, hydrogen unites with a portion of oxygen, and forms carbonated hydrogen, which constitutes flame. Other gases are generated, as carbonic oxyde and carbonic acid, by the union of carbon and oxygen, but they do not produce heat or light. After all these are driven off by combustion, if we stifle the further burning of the wood, charcoal will remain, which consists of woody fiber, being deprived of all the principles except carbon, which preserves the original form of the wood. If this is burned, its carbon will unite with the oxygen of the atmosphere, and produce carbonic acid. The ashes that remain contain earths, metallic substances and alkalies. When wood is burned in a chimney, and combustion is nearly at an end, the draft diminishes, and there is then danger that carbonic acid and carbonic oxyde may come out into the apartment and vitiate the air. During combustion there is no sulphuretted hydrogen given off as from coal, because there is no sulphur in it; but pyroligneous acid is formed, which gives that penetrating effect to smoke.

The woods that burn the longest and have the densest charcoal are, birch, hazel, hickory, beech, oak and elm. All woods

give out heat according to the relative quantities of their carbon. If all the woods used are equally dry, they will give out equal degrees of heat during combustion. Wet wood contains more than one-third of water, and much heat escapes up the chimney while converting this into vapor. The quantity of water contained in recently cut wood amounts frequently to fifty per cent.; wood felled a year will contain twenty-five per cent.

Wood obtained from trees that, without passing into decay, have attained their maturity, will produce greater heat than any any other; as a tree decays, its value for fuel diminishes. To produce the greatest effect of fuel, it should be placed in close stoves.

Charcoal is very valuable as fuel; it is exceedingly porous, containing 5,724,000 pores in one inch in diameter, and produces no flame when burned. The hardest woods make the best charcoal.

Besides its use as fuel, it possesses qualities that qualify it to render service to the arts. If posts intended for fence are charred, before being placed in the ground, they are rendered indestructible to a certain extent. It likewise prevents putrefaction by absorbing sundry gases. It will remove taint from meat that has been kept too long; and being non-conducting, it may be used for confining heat, for freeing liquors from color, and depriving them of empyreumatic flavor, &c.

But the most important fuel now known in the world is coal; the manner in which it has been formed into such immense collections, by the action of water, heat, compression, &c., upon vegetable matter, is not precisely understood.

By analysis it compares favorably with other vegetable matter, and consists of hydrogen, carbon and oxygen, sulphur, ammonia and earthy matter.

It may now be considered for domestic, as well as other purposes, superior to all other combustible matter, and is classed thus, bituminous coals, non-bituminous and open burning. Bituminous are those which soften when brought in contact with heat, and throw out jets of flame.

Cannel is a rarer variety of bituminous, burns with a beautiful white flame, and affords light as well as heat; it is perfectly clean, will not soil the fingers, and may be turned on a lathe to represent any desirable form or figure. I think without exception

that it is the finest coal known, except perhaps Breckenridge, which is very similar.

Open burning coal leaves a white ash, and requires but little attention to keep up a good fire, as a small quantity will keep in.

Non-bituminous coal consists entirely of carbon, there may be a trace of hydrogen, but not more; it emits no flame and affords no gas, the fracture is smooth and the lustre bright, it is difficult to kindle, does not soil the fingers, and makes, when thoroughly ignited, a very hot fire.

Coke is made from coal by depriving it of its hydrogen, consequently it will neither emit flame or smoke, but gives out a radiant heat, and leaves a large quantity of ashes. It possesses the quality of charcoal to a certain extent, and gives out carbonic acid gas, which, if the draft in the chimney is not good, falls into the apartment.

Peat is a vegetable production that is often used for fuel, its smoke is penetrating, and affects the eye seriously; the odor given off is disagreeable owing to pyroligneous acid. If used for cooking, an empyreumatic smell will be perceived connected with everything it comes in contact with, which is esteemed by some. If properly built up it makes a cheerful blaze, and diffuses considerable warmth, about one-fifth as much as an equal quantity of charcoal.

Atmospheric air plays an important part in the complete combustion of fuel; the air admitted should be in equivalent proportions to the material employed, or in other words in mechanical relation to the gases with which it is to combine, and time given for union chemically speaking. Whenever there is incomplete combustion there will be smoke. There is immense waste in this city, and at the large depots of coal of the dust, and small particles, all of which might be mixed with an equal weight of clay, and sufficient water, to admit of being worked into cakes, which when dried will burn longer, and give as much heat, as coal in the crude state. This fine coal may be mixed with peat, saw dust, bitumen, and any other inflammable matter, and become useful in steam engines.

Cow dung makes a good fuel when mixed with mud, or straw, or in fact any dry plant, and is much used in Egypt, Persia and Arabia, where other substances are scarce.

In Sweden, sea weeds and other marine plants, driven on shore by the wind, are dried and used for fuel.

LIQUID FUEL.

Bitumens and oils have been employed as fuel, and are found to give out a great deal of heat. Alcohol is frequently used in the lamp form, and the wick never becomes scorched, or wasted, because the spirit in which it is soaked, never rises in temperature higher than 174°.

Capt. Parry in his expedition to the North Pole used spirits of wine for fuel, and discovered that one pint would heat twenty-eight pints of water, commencing at a temperature of 32°. Fat, oil, or tallow yields a higher temperature than spirits of wine, but produces much smoke unless several wicks are used or an Argand lamp. The Esquimaux and Greenlanders produce all their heat by use of lamps, with wicks made of moss.

When coals are heated to ignition in an iron retort, they decompose as follows, the moment the iron appears red, coal tar distils, as the heat increases tar, ammoniacal liquor and sulphurous acids are produced from the pyrites of the coal, if the heat is still increased the gaseous production diminishes, and coke only remains.

The nature of the combustion of fuel until illustrated by modern chemistry was never understood, all opinions respecting it before were erroneous if not absolutely absurd.

Atmospheric air is indispensable to the combustion of any kind of fuel; it is an invisible substance, owing to its transparency and want of color; from the same reason, water is no doubt invisible to the fish that swim in it.

Wind is a current of invisible air, and the tornado in my opinion is electricity or lightning.

I must now explain how fuel and air are affected by combustion. A combustible body must be kindled before it can burn, or in other words be brought in contact with an actually burning substance to be affected by heat.

When charcoal is made red hot, the air surrounding it is decomposed by the carbon uniting with oxygen, which forms carbonic acid gas, the consequence of light and heat.

To ignite wood or coal is much more difficult than to ignite charcoal, because they are composed of three more principles which the heat must separate, and form carburetted hydrogen gas which joins oxygen and produces flame and water, the latter is at once dissipated in the atmosphere. After the kindlings used have become ignited, the usual practice is to throw on a large

quantity of coal, or pile on wood, which is a very bad plan, and causes actual loss, from the fact that a large percentage of hydrogen gas is formed, which escapes up the flue without taking fire; you may always know when this valuable property is going to loss, by holding a lighted paper in the smoke, if hydrogen is escaping it will ignite. Always so manage your fire that the front portion is red, because your apartments are invariably heated by radiant heat, A good firemaker should be cognizant with the chemical laws of nature.

Remember that bad coals, though cheap in price, are not by any means economical, because they are not inflammable.

All fuel should be kept perfectly dry, as when exposed in damp places, much of its material in burning is converted into water and escapes up the flue, carrying with it the heat that was necessary for its conversion. Unseasoned wood contains at least one-third of its weight of water.

With regard to the quantity of heat that may be obtained from various substances used as fuel, a comparison may be easily made by melting ice.

For instance, two lbs. of wood melts 65 lbs. of ice; two lbs. of coke melts 166 lbs. of ice; two lbs. of hydrogen gas melts 660 lbs. of ice; two lbs. of coal melts 175 lbs. of ice; two lbs. of wood charcoal melts 188 lbs. of ice; two lbs. of tallow melts 204 lbs. of ice; two lbs. of olive oil melts 335 lbs. of ice.

An interesting discovery has been made in Russia, between Dorpat and Norva, of a combustible as califactory and carboniferous as coal. It is of a yellowish color, covered with white spots, and is the subject of speculation among scientific men, from the fact that it is of a much earlier geological period than the coal era.

Mr. Seely said that it was an error to suppose that charcoal had antiseptic properties. It will not assist in the preservation of meat, or of any animal or vegetable substance. The power which it really has is that of absorbing gases, so that it absorbs the offensive emanations from decomposing meat, and apparently makes them sweeter.

Mr. Stetson narrated an experiment with fine charcoal, by which meat which had become quite offensive was entirely changed in one night so that it was cooked, and soon eaten up.

Mr. Pell related an incident with regard to the manufacture of glue. He had proposed the use of charcoal to render inoffensive

a residuum which had formerly been thrown into the river, and turned it to agricultural purposes. It became perfectly sweet, and was a valuable manure.

Mr. Seely said that these facts were not inconsistent with his theory; for meat would decompose just as rapidly under charcoal as under brickdust, although its decomposition in the former case would not be evident to the sense of smell.

The President remarked that fuel was almost invariably the product of organization. We do not warm our feet or cook our dinner from the heat given out by the crater of a volcano; and even where gases are emitted from the surface of the earth, although they have been used for light, they have not been used for heat. It may be a question, too, whether they are not the product of organization. It is a matter of profound interest to observe how wonderful a provision was made for the occupation of the earth by human beings, before the existence of man, by the storing of the vast coal cellars which we find immediately under the surface of the earth. Coal is not only a source of heat but of power, of wealth, and even of life, to a very large proportion of the population of this country. It is the reason why this city sustains such an immense population. It is the reason why the growth of our population for the last ten years has been almost entirely upon the seaboard. The agricultural portions of the community have not much progressed, because the improvements in agriculture enable men to take care of larger farms. Thus, a large proportion of the population are left free to mechanical, scientific and artistic pursuits. Within ten miles of the City Hall, the stationary steam engines and machinery driven by them do the work of at least ten millions of men. This is the work done by coal; and such is its cheapness at the mines, that it will not pay for an additional shoveling over. The cost of this immense amount of labor may then be estimated merely at the cost of oiling and taking care of the machinery, the cost of the fuel being regarded as nominal. In England, the question has been agitated how long the coal will last. With us, the question may be, for a century to come, when shall we have to dip out the first pail of water to get at the coal? New disclosures for the last dozen years have increased the amount of coal above the water level known to be accessible for fuel. It is now becoming a matter of great importance to appropriate each kind of coal to that work for which it is best adapted. Zinc paint

can be made here much cheaper than abroad, because we have the Lehigh coal, which is especially adapted for its manufacture. The Lackawanna will not answer the purpose, although it is better adapted than the Lehigh for steam purposes. Thus there is a distinction even among our different mineral coals, as to their uses in the arts. Immense amounts are lost from our ignorance of the art of adapting our fuel to our work. The necessity of this adaptation will grow upon us as we advance. We consumed over nine million tons of coal last year, and every year we are progressing. Thus we are making room for a larger population of well-fed, well-housed, well-taught men by the economy of fuel, and the economy of the machinery driven by fuel.

Mr. Churchill remarked that gaseous fuel is particularly appropriate when it is desired to apply all the heat at a particular point.

COMPRESSED AIR FOR PROPULSION.

Mr. Wm. L. Haskins, of Williamsburgh:

Mr. President—When railway transit is fast engrossing and superceding all other means of inland conveyance, the best method of facilitating that transit becomes an interesting object of inquiry. When railway stocks, as a general thing, have ceased to be remunerative, owing to the enormous amount of capital employed in constructing, maintaining, and working roads in common use, no little distrust must necessarily be felt in the perfection of the system on which both their structure and their operation depend.

Any improvements therefore, which, other things being equal, shall possess the merit of *economy* and *safety*, is surely entitled to consideration.

The general importance is admitted and has been widely discussed of the need of some arrangement to reduce the weight of locomotives, which destroy the tracks and bridges at a fearful rate. A "*civil engineer*" in the railway Review estimates that the depreciation in the superstructure of railway in the United States—mostly caused by the enormous weight of the locomotives in use—is twenty-six millions of dollars per annum! If this be so, or if that depreciation amounts to half that sum, then a more complete remedy for the evil than simply to reduce their weight—saving only a percentage of that loss arising from it, while retaining the enormous cost of providing and working them—would be

to dispense with the use of them as steam locomotives altogether, substituting another power of at least equal value for the purposes of propulsion.

Such a power is that of compressed air.

I am not now prepared to exhibit models or drawings to illustrate the mode of its application, because it needs only to be stated to be comprehended, and models or drawings would prove nothing. Nothing short of actual demonstration in practice will determinately prove anything.

The car or locomotive designed to be propelled by compressed air, is made to contain within itself a receiver capable of holding it, which receiver may be composed of cap welded iron tubes. These tubes may be laid on the bottom of the car under the floor, and in that case if they be of six inch diameter and 30 feet long, will have a capacity of 65 feet. If more are required they may be laid in double tiers, and may also be incorporated into the sides and top of the car. The cost of such tubing will be $1.65 and weigh about 12 pounds to the foot. The receiver will be charged before starting, and recharged at the points necessary on the route. The compressed air is then admitted to a small air cylinder, as in the case of steam, which is connected with the driving wheel. The tubes forming the receiver are connected with each other and with a vertical tube which extends through the top of the car, there turning in the direction of the route at a right angle, with an air-tight valve. Into this projecting arm the charge of air when required is admitted to fill the receiver. The time consumed in charging and recharging, will not probably exceed six seconds. The car will be recharged on the route without necessarily stopping for that purpose, by erecting over the track a simple device to hold a charging vessel, mounted on a track of its own, independently of the track of the car. This charging vessel is furnished within an open bell mouth, in the throat of which is a valve, and into which the projecting arm of the receiver of the car is made to enter. The concussion opens both valves together,—that of the charging vessel and that of the car receiver—establishing thereby a complete communication between the two motors, and allowing the free passage of the compressed fluid from the one to the other.

The distance which may be run between supplying stations will of course be governed by the size of the receiver, and the grade to be traversed. The air will be compressed by the aid of

stationary steam power into a small tubular reservoir. This reservoir will be laid along the track, between the rails, for the transmission of the compressed fluid to the supplying stations.

As an available motive power for the propulsion of cars on railways, compressed air will be found to possess important advantages over steam, of which, in positive effective force, it is the exact equivalent, reckoning pound for pound. In the use of compressed air, we derive all the effective force steam is capable of imparting at the same density; while, with the one, we may use with impunity a far greater pressure than would be safe with the other. The reservoir and receiver for compressed air may be charged up to two or even to five hundred pounds, if the connecting apparatus be made capable of enduring the test, without the risk of danger from explosion; while, with steam, we cannot safely use a greater pressure than fifty to seventy-five pounds. Compressed air, at any density that would ever be requisite for the propulsion of cars, is known to be free from the hazards, by explosion, which so often result from the use of steam. Hence the relative safety of the two agents, and the manifest advantage to be derived from the use of a medium power, which, at equal densities, is fully equal to that which in common use and by common consent has obtained the character of being the best.

The application of compressed atmospheric air as a motive power is based upon well-settled principles of mechanical science, and needs no argument to establish its practical value. The method proposed of employing the power, after making due allowance for the loss by waste and that due to the process of compression by friction, would reduce the cost of propulsion greatly below that of the direct agency of steam; where the excessive waste of caloric by exposure to the atmosphere—to which stationary steam engines for the compression of air are not subjected in like degree—the increased cost of construction rendered necessary to provide for the immense weight of locomotives, with tenders and material, involving a grievous daily tax in the form of interest; and the serious item which the wear and tear of the road becomes under the grinding, crushing gravity of the steam locomotive, are so many among a host which might be adduced of formidable counterpoises ever at war with the economical administration of a railway.

On the score of economy, in the comparison between the direct

and indirect power of the two mediums—steam and atmospheric pressure—a careful investigation, not only into the administrative department, but into that also of construction for either system, will indicate the favorable consideration which is due to that of compressed air.

Suffice it to say that, by the compression of the atmosphere, we obtain one of the most potent, if not the best, of the known powers for the propulsion of cars on a railway. In effective propelling force, compressed air is, comparing densities, the full equivalent of steam. While it dispenses with much of the machinery and construction incidental to steam as a power on the track, with superadded cost and weight, it involves no complications that make it difficult to the comprehension of a child of ordinary capacity and intelligence practically to understand and apply. It is also relatively free from danger—not comparatively, alone, but superlatively safe—and for the service of the rail track, in an economic and in every other point of view, it is not the competitor alone of steam, but its superior.

On the 26th of November last I submitted to the World, and had published in that journal, a proposition to introduce compressed air as a motive power for a railway to be constructed in Broadway, called the overhead railroad, to occupy the space on either side of the street, 16 feet above the sidewalk. The structure to be an ornamental terrace or balcony of iron, projecting from the buildings, covering the entire walk, and even extending two and a half or three feet beyond it into the street, supported on one side by wrought iron columns placed in a line with the present lamp posts.

The plan of the structure was projected by Mr. John B. Wickersham, in 1854, and was much noticed at the time and favorably spoken of by the press and by property owners in Broadway, though Mr. Wickersham proposed to propel his cars by horse power. In my article, I undertook to show that the use of horses in such a position would be inexpedient, if not practically impossible. The plan there proposed is one that is worth considering.

Mr. Dibben.—As soon as the pressure falls below 60 lbs. you must increase the size of the cylinder or change your gearing, or your speed will be reduced. To carry a car a mile, you would need about 1,000 cubic feet of air at 60 or 80 lbs. pressure to be kept up to that pressure.

Mr. Butler.—It would be necessary to have a variable cut-off; but I do not see how, in running four miles, with a proper supply for the first two miles, even a variable cut-off could bring up the speed for the last mile. It would be very much like getting up steam in your boilers, and then putting your fire out.

Mr. Fisher.—How nearly new is this general idea?

Mr. Haskins.—It is not new. Carriages have been run ten or fifteen years ago; but they had no mode of replenishing the power.

Mr. Stetson was confident from some careful calculations that the advantages of compressed air for a motive power had been generally underrated by mechanics; and that air could be sufficiently compressed to run a car four miles or more. The difficulties could be overcome, by passing the air through a small opening, so as to produce only the requisite pressure, or in some other way to be invented. The varying of the cut-off need not commence until we get near the end of the journey.

Mr. Fisher said that compressed air had been experimented with for sixty years. There would be various economies in its use upon railroads, such as the use of inferior fuel, or of water power at the stations, the saving of loss while the locomotive is waiting, and the dispensing with the firemen. For a line through Broadway, five miles in length, the experiment was worthy of trial. He had computed that a carriage could be driven five miles over a common road with a single charge of air.

The President said the time must come when the space over the sidewalk will be devoted to carrying passengers in some of the most important streets and avenues of this city. For this elevated track horses could not be used; and if any man could devise a substitute, so that horses could be taken from our streets entirely, he would be a public benefactor.

Subject selected for the next meeting is "The mechanical and chemical properties of cotton, and substitutes therefor," proposed by Mr. Stetson. Adjourned.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
February 21, 1861.

Professor Mason in the chair.

Mr. Johnson proposed the subject of Soluble Quartz for future consideration.

Mr. Englebright proposed, subsequently, the subject of "Ventilation."

VENTILATION.

Col. Ruttan, of Canada, presented some of his views of ventilation, and exhibited drawings in illustration. As to the necessity for ventilation, all were agreed upon that. The question was merely as to the *modus operandi*. Perhaps no man living had expended so much time or money in experimenting upon ventilation as he had. He had come to the conclusion that the principles upon which ventilation is usually based are wrong *ab initio*. The common method is to ventilate by mechanical, and not by natural means; and the mechanical means are a departure from nature in this wise, that they are predicated upon the theory that hot air naturally goes upward. That is not the fact. Air has weight; and heating it does not deprive it of its weight. Hot air, therefore, naturally goes downward. It usually goes upward, because we usually allow cold air to force it up. If we provide means for taking the cold air from under it, hot air will fall as certainly as lead. Warming a house by a true ventilating process is the cheapest and most healthful mode. When a man's feet are cold, he is cold all over; and when his feet are warm he is warm all over. The method which he would propose, founded upon the true theory, was substantially this. The floor joists are to be furred off about two inches, so that there shall be a connected stratum of air between the floor and the ceiling below, This air chamber communicates all around the edge of the room with the room, and communicates also with the chimney or ventilating flue. This stratum of air effectually prevents cold feet; for even should it sink to 40°, the feet being always covered with leather and woolen, the natural heat of the body will prevent them from becoming cold. The air is warmed in the hall, and admitted into the room at the top. It is not necessary that it should feel warm to the hand; for air at 90° will feel cold to the hand, and yet will warm a room sufficiently. The chimney acts as a pump drawing out the cold air first from the space between the floors and then from the lower part of the room, while the warmer air in the upper part of the room falls to take its place, and the heated air rushes in to fill the vacuum in the top of the room. It is not necessary that rooms to be heated should be immediately connected with the hall. He had warmed a room where there were two intervening rooms which were not warmed.

The cold air being drawn off from the third room only, the warm air passed through the other two rooms along the ceiling, being buoyed up by the cold air in them, and entered and warmed the third room.

The President.—How do you ventilate cars?

Col. Ruttan described the process for winter and also for summer ventilation, in each case the air being drawn from the lower part of the car and being supplied above.

Mr. Stetson said that, in the ordinary ventilation, taking the air from the top of the room, as the heated air immediately rises to the top of the room the lower part of the room is poorly warmed. In a car, he had found a thermometer to stand at 110° at the top of the car and at zero at the bottom. While our heads, therefore, suffer from the heat, our feet are cold. Col. Ruttan's process always takes out the coolest air in the room, which is not only the greatest economy, but allows the room to be completely filled with the warm air.

Mr. Johnson inquired what was the economy of fuel?

Col Ruttan stated that he was warming his house in Canada—a two story house—at an expense of 25 cents per day, using coal at $5.50 per ton. The ceilings were altogether too high for that climate; for in a cold climate, they should never be higher than 9 feet. It takes considerably more than double the fuel to heat a room 12 feet high than if it were 9 feet. The open stairway, which is copied from southern Europe, is totally unsuitable for a cold climate. Every staircase should be so closed as to prevent the air from going up to warm portions of the house where the heat is not required. With a close hall, low ceilings and a true ventilation, you may defy the cold and the doctors too.

Mr. Garbanati regarded the saving to the health as being by far the most important advantage of the proposed system of ventilation. It cannot be healthy to have the feet in an atmosphere so much lower than that which surrounds the head. What is needed is a system of ventilation which equalizes the heat, as this system claims to do.

COTTON AND SUBSTITUTES THEREFOR.

The subject for the evening, the "Mechanical and chemical properties of cotton, and substitutes therefor," was then taken up.

Mr. Stetson.—The first reason why cotton is so extensively used is its cheapness. Nature produces this fibrous material

ready to our hands, and all that we have to do is to reach forth our hand and take it. There is no rasping, or pounding, or grinding necessary to prepare it. Another reason is the uniformity in the length of its fiber. Different varieties have a fiber of different lengths, that of the Sea Island cotton being long and fine. The average of upland cotton is about three-quarters of an inch, and the variartion between the length of the different fibers of the same variety is less than one-fourtn of an inch. Other materials, as hemp, have a much longer fiber, which is convenient in coarse work, but will not answer for the purposes to which cotton is applied. In the manufacture of cotton it is passed through a series of pairs of rollers, each revolving twice as rapidly as the next before it, which draws it out to a great length and with uniformity. No other fiber can be drawn out upon that principle to the same extent. After being passed through the rollers once, a dozen or more threads are placed together and passed through again; and so on, until each ultimate strand of cotton thread has been passed through several thousand times. Another property of cotton is its adhesiveness, which gives it strength and enables us to draw it out to extreme fineness.

Mr. R. L. Pell.—The word cotton has been adopted from the Arabic word meaning the same article, and which, when put in English letters, would be pronounced "koturn;" in Egypt it is called "gotun;" in Spain, "algodon;" in Germany, "baumwolle." This substance has to a great extent superseded linen, silk and wool as a material for dress, being found admirable for sheetings and shirtings. Within the memory of many persons in this room it has risen from insignificance to be one of the most flourishing branches of American industry, surpassing other fabrics that have existed for hundreds of years.

It was known and used 400 years before Christ, as mentioned by Herodotus. It is spoken of by Arrian and Strabo. Pliny describes it, and says it grew and flourished in Upper Egypt. The Arabians were the first that brought it into general use.

The cotton plant is found growing wild on the Niger, Gambia, Senegal and other African rivers; also on the coast of Guinea, from whence cotton cloth was carried to London in 1590. And was also used as clothing by the Mexicans when America was discovered by the Spaniards. Its manufacture was introduced into Europe by the Moors of Spain, who at the same time effected the introduction of the silkworm, mulberry tree, rice, and sugar-

cane, all of which I believe were lost when the Moors were expelled. When it was afterwards introduced from the Levant, it was only made use of for candle wicks, The natural color of cotton is white, and sometimes yellow, with filaments from a half to two inches in length, and less than the two thousandth part of an inch in diameter.

It requires a vast deal of care in its cultivation, as it is readily injured, being quite delicate; 425 miles from salt water it fails entirely. As the pods do not ripen at the same time, it is necessary to go through the plantation frequently, picking only those that have opened. The qualities of cotton are—length of fiber, fineness, softness, strength, equality of filaments, freedom from seeds and impurities. Short filaments are considered the best for spinning into wefts, and long cylindrical ones into thread.

The cotton plant is a natural production of tropical regions; the American, raised on the sea-coast of Georgia, is the best, and is known, commercially speaking, as sea-island cotton. It is three times longer in its staple than the cotton grown in India, Demerara, Cayenne, Surinam, the Bahamas, &c. The Egyptian cotton cultivated by Mehemet Ali is of fine quality, but sells low, because it is badly cleaned. That raised in the Levant is not much esteemed.

The Hindoos have been celebrated for centuries for the perfection of their cotton fabrics, which are distinguished by extraordinary names, as mullmals, tarnatans, tanjeebs, terridams, &c. Some of these are spun with such surprising fineness, that 20 yards have been known to weigh only one grain, and one pound extended would reach 110 miles. England, by improved machinery, has surpassed this, having spun one pound that would reach 165 miles in length. A species of cotton grows on the banks of the River Magna, which manufactured into muslin has been sold in England for $60 per yard.

I think within the next twenty years' flax will compete so favorably with cotton as to supersede it to a great extent. It is next to impossible to distinguish between the fibers of the two when examined in the raw state; and it is now a matter of doubt whether a large portion of the cloth wrapped around the mummies found in Egypt is not of cotton fabric, notwithstanding the universal opinion that it consists entirely of linen. Nothing is now more difficult, after a most thorough examination of any number of specimens of mummy cloth, than to determine whether

they are composed of cotton or flax. It can only be accomplished through the medium of a powerful achromatic microscope, under which flax appears cylindrical and jointed like a cane, whereas cotton is flat, not jointed, and twisted similar to a corkscrew. Cotton may be distinguished from all vegetable fibers by this corkscrew form.

I must adhere to the idea however, that the material used by the Egyptians to wrap their mummies in, was generally if not wholly linen; it was the national manufacture of those people, and exported by them in the form of thread, in the days of King Solomon to the Kingdom of Israel, and to Greece in the days of Herodotus, and continued the most esteemed article for clothing until after the Christian era. In 1253 flax was manufactured into linen in England.

Flax, in Latin linum, from whence the word linen is derived, is an annual, having a slender, smooth, hollow stalk, rising to the height of two feet, and succeeds best in a rich, deep, loamy soil. When employed for making thread, the plant must be permitted to grow until the seeds are ripe.

Hemp (cannabis sativa) has a fiber much stronger than flax, and is used for making canvass, &c. It was a native of Persia, but has been now naturalized over the world. It grows three feet high; the male and female are distinct in the clusters of flowers. Russia grows a larger quantity and exports more than any other country. Its leaves are narcotic, and in eastern climates are used as the Chinese use opium, and smoked like tobacco; the seeds are frequently roasted, mixed with salt and eaten on bread, when they become an increaser of pleasure and exciter of desire. It is a fine graceful plant, and has grown on my farm to the height of fourteen feet; owing to its tough elastic fibres it is better adapted than any other plant for the making of cordage; the refuse affords an admirable fuel, and the seeds a perfectly limpid, volatile oil, possessing no smell. If the plant is grown on the borders of plantations it will expel all insects, and will not degenerate for many years if the ground is kept in good condition. It may be called a smothering crop because its copious foliage kills every thing that is grown with it.

There are various other plants that yield fibers of sufficient strength to be made into thread, such as he golden rod (solidago canadensis), a perennial plant, growing five feet high. The sun flower (helianthus) the fibers of which are as strong as pack

thread. The common nettle (urtica droica) may be advantageously manufactured into cloth; also the white leaved nettle (urtica nivea), the hemp-leaved nettle (urtica cannabina), the swallowwort (asclepias syreaca), are good textile plants. There are other common plants that yield fibres sufficiently strong for thread, as the esparto-rush (stipa tenacissima), the common broom (cytisus scoparia), the Spanish broom (spartium junceum), different species of the aloe, and sundry plants of the lily tribe. Our southern regions abound in plants that possess a fibrous structure, which renders them capable of being employed in the manufacture of thread, cordage and cloth.

Wool, from its filamentous texture and elasticity, has many advantages over all other materials used for clothing, it possesses a felting property that enables the manufacturer to render it exceedingly compact, or so thin as to rival cotton goods; it is a much better non-conductor of heat than cotton or linen, and when worn next the skin prevents the heat of our bodies from escaping, and consequently prevents us from sudden external changes of temperature. Its rough surface causes cutaneous exhalations from the skin to a greater degree than any other known material, and will always be found serviceable in preserving any who may be exposed to epidemic influences, malaria, &c. And I believe that those persons who may, from necessity or otherwise, be compelled to reside in a fever and ague district, will be preserved from its effects by wearing flannel next the skin. On the Pontine marshes, and Roman plains, where epidemics of all kinds abound, I noticed that the shepherds were invariably, during the warmest days in summer, clothed in sheepskins, and I never saw more healthy looking men than they were, except, perhaps, the Catholic priests.

One hundred parts of merino fleece contains:

Fat matters, capable of being dissolved by washing	33.00
Earthy substances	26.00
Fat matters	10.00
Clean wool	31.00
	100.00

The influence of temperature on the growth of wool is very great. Sheep grown in a hot climate yield coarse wool, and those in a cold climate, fine. The staple of wool may be increased in

bulk or length by a superabundance of food, which allows the secretion which forms the wool to increase.

Wool and cotton require an entirely different treatment from flax in spinning; the fibers of these substances are short, and must be made into a roll before they can be drawn into a thread; they, together with silk, are spun in a dry state; whereas flax, and all vegetable fibers, require to be moistened during spinning. The wool of sheep, as we now have it, is the product of cultivation; in their natural state their hair is short, with soft wool near the skin. All quadrupeds inhabiting cold climates have coarse hair, which completes its growth in one year, and then falls off, to be succeeded by a fresh coat.

But of all known fabrics, silk is the most conspicuous, and it is surprising that men should have advanced so far in civilization before they discovered that the caterpillar was capable of producing so splendid a material for clothing of endless variety and beauty.

China was no doubt the first to make use of silk. Twenty-four thousand eggs of the silk moth weigh a quarter of an ounce. The worm lives fifty-four days; in thirty days of this period it increases nine thousand six hundred fold, and during the last thirty days of its life, eats nothing. Seventy pounds of cocoons may be obtained from the consumption of eight hundred pounds of mulberry leaves; one hundred and five pounds of cocoons give nine pounds of spun silk; and two pounds of cocoons will produce a thread one million, one hundred and seventy-six thousand feet long. More than one million, six hundred thousand people derive their entire support from the culture and manufacture of this valuable product; and the silk worm no doubt creates an annual circulating medium of at least $230,000,000. Still, the nature of the silk worm, and the process of producing silk, remained a profound secret with the Chinese, and was utterly unknown in Europe until the reign of Justinian, 555 years before the birth of Christ.

Mr. Seely.—Attention had been called only a few years to the chemical nature of cotton. Gun cotton, when first known, was generally considered valuable as a substitute for gunpowder. This idea has now been abandoned; but it has certain advantages, which still make it valuable for particular cases, perhaps, for instance, in charging shells. It is unaffected by moisture, is more explosive, is more easily prepared, and the materials may

be more readily obtained. But gun cotton has another value, for it is the foundation of the art of photography as it now stands. It has been suggested that cotton should be dissolved in hydrocholoric acid, that any desired form should then be given to it and the acid evaporated. This can be done, but the cotton thus precipitated has no strength. Its strength is caused by its fibers. The composition of cotton, sugar, starch, gum arabic, dextrine and woody fiber is chemically the same, $O_{12}C_{12}H_{10}$. Gun cotton is chemically different. Two or three atoms of hydrogen are taken away and two or three atoms of the peroxyd of nitrogen, NO_4, are substituted. Yet this change does not affect the appearance of the cotton, even when examined by the most powerful microscope. But upon trying it with the polariscope, we find that the effect upon polarized light is precisely the reverse of that produced by the ordinary cotton. Dr. Van der Weyde states that he has converted cotton into sugar. The cotton is boiled in an acid for some time. First it is changed into dextrine, and then into sugar; but it is grape sugar, and will not crystallize. The composition of sugar is nearly the same as that of cotton and woody fiber; it is $O_{12}C_{12}H_{12}$.

Mr. Pell stated that in Lowell, within the last year, a pound of cotton had been spun into a thread 358 miles long.

Mr. Seely had seen a statement that, in England, 1,096 miles had been reached; but that seemed hardly credible.

Mr. Babcock.—Cotton is also valuable because it is soft and elastic, and hence it is used in cushions and for similar purposes. It is also used in a form in which it is harder than iron itself, for the rollers of calendaring machines. Compressing cotton by hydraulic pressure, a roller is produced so hard that it can be turned like iron in the lathe, and forms a polished, smooth surface, so hard and elastic that, even with a sledge hammer, no permanent indentation can be made. The rollers are manufactured in Providence, R. I.

Mr. Garbanati.—Wool could not be profitably grown for clothing alone, and the demand for the meat being limited, wool must be limited in its production. Silk is expensive, and must be confined to special uses. Flax is objectionable because it is too good a conductor of heat to be worn next to the skin. Hence it is important to find some substitute for cotton, so that we may

not be dependent upon a single locality for our principal clothing material.

Mr. Dibben.—Cotton is naturally more durable than flax, hemp and similar materials, because the latter are not in their growth exposed to the weather, and hence not protected from it; while cotton and wool are naturally weather proof.

Mr. Butler explained the practical operation of cotton spinning, in order to show the difficulties in the way of the introduction of any new material. Cotton machinery, as a whole, is more perfect than any other machinery in the world. The cotton can be picked from the plant, and in twenty-four hours woven into cloth; and this cannot be done with any material requiring rotting, hatcheling, mixing up, or such processes. As time is money, this is an important consideration. If a manufacturer were to have five per cent. of sea island cotton mixed with the medium upland to which his machinery is adapted, he could not use it. The fibers being too long, would be broken by the rollers. It would take a century to produce complete working machinery for a substitute for cotton.

Mr. Pell prophesied that, in less than fifteen years from this time, flax will be used wherever cotton is now used for a mixture with woolen. He described a steam cannon, twenty feet long, which would instantaneously convert flax into a substance so nearly resembling cotton as to be indistinguishable from it without the microscope.

Mr. J. R. Haskell exhibited specimens of the flax cotton produced by the process just described. He had tried it with cotton machinery, and had come to the conclusion that it would not answer for that. Upon mixing it with wool, half and half, it worked as well as cotton; and he had been told that the article thus produced was superior to all wool, being susceptible of a higher finish. In woolen machinery, in all probability, the flax cotton could be spun into threads alone. Satinet has the warp of cotton and the filling admixture; he should propose to have the warp and filling alike, half flax and half wool.

Mr. Butler thought that, for admixture with wool, this flax cotton would be valuable, but not as a substitute for cotton. He would not by any means discourage its production. The fibers range from half an inch to three inches in length, which would not do at all for cotton machinery. The sample exhibited he should judge to be weaker than cotton.

Mr. Haskell stated that the mode of producing that cotton is this. The cannon is filled with flax and water, under a considerable pressure, so that the moment the pressure is removed the water flashes into steam, completely separating the fibers of the flax from each other, as the whole contents are discharged into the atmosphere. A second operation had been proposed, but seemed unnecessary.

The same subject was continued for the next meeting.

On motion, the association adjourned.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
February 28, 1861.

Professor Mason in the chair.

ORIGIN OF THE GULF STREAM.

Mr. C. W. Denison, as the result of eight years investigation, submitted the following propositions:

1. The Gulf Stream is of subterranean origin.

2. Its progress, in a certain direction and rate, is caused by the shape and revolutions of this planet.

3. It is heated by interior volcanic fires, supplied from the igneous portions of the globe.

4. The Gulf Stream is fed from beneath by a constant flow of waters. Some of these are the Mediterranean and other adjacent seas.

5. The color, heat, current, motion, *animalculæ*, sedges, taste, odor and all other peculiarities of the Gulf Stream, prove it to be subterranean in its origin and progress.

6. The trade winds and the formation of the shore of the Gulf of Mexico, have nothing to do with the origin, characteristics and progress of the Gulf Stream.

The color of the Gulf Stream, he said, is deep blue. That this is not caused by its saltness is evident, first, because salt would not make it blue; and, second, because it is no more salt than the adjacent waters which are not blue. The color is caused by the sulphate of copper which the water contains in solution. The water enters the Mediterranean sea from the ocean at the rate of three miles an hour, and this is exactly the rate of the Gulf Stream, indicating a connection between the two. His explanation of the phenomenon is, that the water of the Mediterranean sinks into a vast chasm in the earth at Scylla and

Charybdis, and thence passes westward through the interior of the earth, becoming heated by volcanic fires, and charged with the sulphate of copper, until it finds vent in a vast chasm along the American shore. The water of the Gulf Stream is in perpetual eddies, as though boiling up from below. The *animalculæ* of the Gulf Stream are not found in the Gulf of Mexico or the Bay of Campeachy, but are identical with those found in the Mediterranean sea. The sedges found in the Gulf Stream are identical with the fuci of Egypt, and are probably derived from the Nile. The odor and taste, derived from the sulphate of copper, are found only in our Gulf Stream, and in similar streams. The reason of the failure of the Atlantic Telegraph was probably, that there is a deep chasm opposite the coast of Ireland, the bottom of which no cable could reach. The geysers of Iceland rise and fall with the tides, indicating a connection with the ocean, while warmed by volcanic fires.

THE PYROMETER.

Dr. Vander Weyde exhibited a pyrometer invented by Mr. G. C. Aycrigg, sixteen years ago, and another of Gauntlet's patent, sent from England, similar to his own in general principle, excepting that the different metals extended the whole length of the handle instead of being confined to one end. These pyrometers being exposed to a certain heat, the longer the exposure the greater would be the temperatures indicated, because a greater length of the two metals would be heated. But Van der Weyde's pyrometer, having the tube and the enclosed rod of the same material, excepting for a few inches at the end, the conduction of heat up the handle would not affect the results shown by the index.

Mr. Seely.—Unless the pyrometer was to be employed for specific purposes, I should not think it of much value. For high temperatures, Wedgewood's pyrometer may be used; and for low temperatures, the mercurial thermometer is the best. For scientific purposes, there are other methods of measuring heat more accurate than any pyrometer. Oxygen diluted with nitrogen, will produce in the combustion of hydrogen, a certain degree of heat which can be measured with a mercurial thermometer. Put in less nitrogen, and the temperature will be higher, but can still be measured. Thus we have a scale that determines with accuracy, the different degrees of temperature. Make the mixtures

so that a metal will melt, and we can ascertain within ten or fifteen degrees its melting point. Alloys may be made of different degrees of fusibility in the form of shot, and the melting point of each ascertained. Then in order to measure heat, it will only be necessary to ascertain by trial, that a certain shot will melt, but that the next to it in the scale will not, when exposed to that heat.

DISINFECTION BY CHARCOAL.

Mr. Johnson exhibited a mummified mouse, the mouse having been buried in charcoal dust two years ago; and suggested that charcoal should be used in burial cases.

COTTON AND ITS SUBSTITUTES.

The Chairman.—I procured samples of the six best cottons, and subjected them to microscopic examination. Their peculiarities were these: the fiber at first appeared knotted; but more careful examination disclosed that these were bends in the ribbon, which were fixtures, and had probably occurred in the ripening of the fiber. With one exception, it was found that in proportion as the fibers are larger or longer the bends were further apart. The cotton with the small fiber and infrequent bend, was from Texas, and was worth 15 cents per lb., the average being 11 cents. The width of the fiber of the Florida cotton was certainly three times that of the Texas cotton. The cottons appeared to be good just in proportion as they approached the South sea air. While the width of the cotton fiber varied from 1-1200th to 1-3000th of an inch, over 300 of these bends were found to the inch. The joints of fine wool proved to be far more numerous than the bends of the cotton, nearly double. In the length of fiber, the cotton from the dest districts was almost uniform. Cotton is valuable in proportion as its growth is so mature that all the fibers in the boll are very nearly of the same length; for then it comes into fair comparison with wool from the same flock of well-kept sheep.

The object of spinning-machinery is to straighten the fibers, to cleanse them, and get them into such a relation to each other that they will draw a twist evenly; and the same force being constantly applied, the more uniform the length of the fiber, the better it will work. At least nineteen-twentieths of the value of our cotton fabrics is due to machinery. In 1841, the father of your chairman, who had established the first cotton factory in

the State of New York, carted cotton from Southern Virginia to New York, and then it was carried by sloops to Schodack, and carted to his factory; and he made a coarse cotton cloth, a considerable part of the weight of which was starch, and sold it at 88 cts. per yard. A far better article can now be bought for 5 cents. The wool machinery sprung up at the same time, and conforms in many particulars to the cotton machinery. The two great provisions of nature for the clothing of man are the cotton for the warm climates, and the cotton and wool for the cold climates. To bring into use any other fiber for the purpose of human clothing, even if that fiber is in its nature equally valuable for clothing, that space of nineteen-twentieths must be somehow filled up before that new fiber can come into actual and common use. Flax is not a single fiber. We obtain it only by breaking up the natural fibers, not at their places of original joining, not by removing the material that combined them, but by breaking them absolutely into fragments. Having found crystals in wood in proportion to its hardness, he had inferred that the hardness and coldness of flax were due to the metallic and mineral crystals contained in the fiber. An analysis shows that there are from 2½ to 4 per cent. of mineral and metallic matter in flax, while cotton is simply cellulose, without a particle of mineral in it; hence, the flax is unsuited for wearing next the skin. Flax is one of the most tenacious of all fibers, and, in proportion to its width, one of the longest fibers known. So intensely close are the joinings of the fibers that it is almost impossible to separate them; and when we attempt it, whether by explosion, by the hatchet, by the hammer, or by the swingling knife, it is only split, and the fragments that chance to split unevenly are thrown off in the shape of tow. It is impossible that hands or machinery should spin as even a thread of linen as the machine will spin of cotton. Napoleon offered a reward of $30,000 for the invention of a machine to spin flax as the English machines spin cotton, but all attempts to accomplish it have failed; and from the nature of things, it seems impossible that it should be otherwise. Until machinery is found to cut the fibers of flax into even lengths, and split them evenly, it seems to be impossible, at any rate, to draw flax into thread with the same machinery now in use for drawing cotton and wool.

Mr. Veeder.—Fine cloths had been made of wools of different staples, and wool and cotton were incorporated to a very great

extent in the same thread. Although the cotton fiber is so much shorter than that of the wool, yet they work so well together that when the thread is finishéd, the wool has so completely absorbed the cotton fiber that it requires much skill to detect the cotton.

The President.—The cotton fiber being but a twentieth part the size of the woolen, is caught upon the hooks of the wool and wound among the woolen fibers. The machinery acts upon the woolen fiber, and it is necessary that that should be of nearly uniform length.

Mr. Veeder.—In England, old garments are cut up by machinery until the material is reduced almost to a powder, and this goes in with the larger woolen staple, and is wound up with it in the process of twisting; and thus a heavy cloth is produced which is not so strong, however, as cloth made without this addition.

The President replied that here, also, the shorter fiber was taken up by the wool, while the latter, being acted upon by the machinery, must be of nearly uniform length.

Mr. Babcock said that another substance, called "flock," was more used, which is sheared from the surface of cloth in finishing it, and is put into the fulling mill and felted into the cloth.

Mr. J. R. Haskell.—If the fibers of flax were separated perfectly, and the glutinous matter dissolved, probably no mineral matter would be found in them. Upon using a caustic solution, instead of pure water, in the steam cannon, he had found the flax fiber to be much smaller than that of cotton. If linen is too cold to wear next the skin, wool can be worn next the skin, and linen, which is more durable than cotton, and looks better, outside. He exhibited specimens of clothing manufactured from half wool and half flax.

Mr. Johnson said that he had learned from the catalogue of the World's Fair, that fine cottons from India were there spun into thread, one pound of which would be 115 miles in length. In England, one pound of yarn has measured 167 miles; but this yarn could not be woven by machinery. Yarns were exhibited, Nos. 200, 400, and 600; the latter would be 280 miles to the lb. A small specimen was exhibited as high as 970 miles to the lb. One statement makes the number 5,408, but this was evidently an error.

Mr. Seely.—The reason why linen can be more reaily dyed than

cotton, is that it consists of bundles of fibres which the dye may penetrate. The new and splendid colors from coal tar will dye silk, wool and linen without any mordant; but in dying cotton, it is necessary to wash the material with a weak albuminous solution. This solution is acted upon by the dye, and becomes insoluble; so that the fibers of cotton have an insoluble colored covering upon the surface, while wool and linen have the color all through the interior.

Mr. Veeder considered wool cooler in the summer season than cotton, and the cotton warmer in the winter, provided it is close, of sufficient thickness, and has between it and the skin another garment to cut off the direct communication. But, in the latter case, the question of health arises, whether the exclusion of the external atmosphere will not prevent the proper exhalations from the skin. Sheep should be more extensively raised. They can be raised for food; their hide is of value, and there is no part of the animal which is not useful, independently of the value of the wool.

Mr. Nash.—The English took four pounds of Indian cotton, at five cents, and one pound of American cotton, at fifteen cents, making five pounds at seven cents, and spun that into cotton thread, and then they could sell it at eighteen cents. The American wool is the best in the world, having from 300 to 400 serrations to the inch; while the best of European wool would not exceed 250 serrations to the inch. Our cotton and wool combined will make a satinet that the English cannot equal, and one much stronger and more durable than the English cloths of wool alone. In Africa, it is said that there are no less than sixty different trees of cotton, one of which is as tall as the elm, producing cotton with a fiber over a foot long. We are out of the latitude of cotton in the United States; the plant has been acclimated here, and it is a great question to find what kind of cotton is best adapted to our soil and climate.

Mr. Garbanati considered the question of clothing as one of political economy. It was the question of the production of the best article, in the greatest quantity, and at the lowst price. And the questions of freight and monopoly are important considerations. Other articles may be applied to this purpose, without materially diminishing the use of cotton. Plants now neglected may be hereafter found invaluable.

Mr. Dibben was of opinion that flax or any other similar mate-

rial, even if cut into proper lengths, could not be spun upon cotton machinery with the same facility as cotton.

Dr. Van der Weyde said that cotton from Africa could not be used on account of its coarseness. In India the fiber is too short; so that the United States have the monopoly of cotton for the whole world.

Dr. Richards had heard, in a lecture upon Iceland, that cotton is one of their productions, we have the same plant—the swamp cotton grass—growing native in most of our swamps, especially in the northern part of the State of New York.

The President said that he had been unable to procure a specimen of the yellow China cotton, which was much prized, and from which nankeen was formerly extensively made. He would bring a specimen of it next week.

NEW SUBJECT.

Mr. Dibben proposed for the next evening, the subject of "The Electric Telegraph and Telegraphing Apparatus."

Adjourned.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
March 6, 1861.

Prof. Mason in the chair.

The Chairman took occasion to allude to the improving prospects of the American Institute with regard to the practical accomplishment of scientific work. The proceedings of this Association were now reported, and 200,000 impressions circulated every week. He believed that the American Institute would before long have a permanent home, with a laboratory devoted to scientific investigation. He was confident that men of wealth would be glad to sustain permanently in such a laboratory the best investigator that could be found. We might hope, therefore, to obtain new light upon fundamental questions which yet remain unanswered as they were in the days of Newton and of the elder Bacon, the questions of vital force, and the beginning of the encroachment of vitality upon the regions of purely elementary matter, what are its laws, and how they operate.

ELECTRIC TELEGRAPH.

Mr. Dibben said that in the first employment of telegraphing apparatus the spark was used. The first experiments were generally made by Germans. The next step was the discovery that

a current of electricity would deflect the magnetic needle; and this was applied to the transmission of messages, and is the basis now of the English system of telegraphing. About the year 1826, Mr. Harrison Gray Dyer, of Long Island, used a registering apparatus, which produced a chemical effect from the spark upon prepared paper, somewhat similar to the plan Bain used afterward. Cook and Wheatstone invented an apparatus, in which they used a double-line alphabet, making the alphabet much more brief by its combinations, and also a temporary and permanent magnet somewhat resembling the plan of Mr. Holcomb. After that came the electro-magnetic telegraph, invented by Professor Morse, or, as others say, by Professor Henry, or perhaps by some other person. At any rate Professor Morse made the first practical instrument, and being aided by the government in trying the experiment, that experiment was the beginning of practically sending messages by the electric telegraph. Then came the House telegraph, using a type-wheel, printing the message in common type, instead of using the Morse alphabet of dots and strokes. The American system of telegraphing has been far in advance of that of any other country; one reason for which is the fact that wires are elevated more, and thus the prime current is not induced to leave the wire so rapidly. The Atlantic telegraph should theoretically have worked; but the gutta-percha insulation was so defective that the prime current soon found its way to the iron wires, and thus the insulation was destroyed.

There are two theories of electricity; the first, that of Ampère and others, that the elementary molecules of matter possess inherent in their substances and inseparable from them, quantities of electric fluid. Those substances that possess negative electricity, such as oxygen and chlorine, are called electro-negatives, and have in practice a tendency to appear at the positive pole of the battery in electric decomposition. The metals, and hydrogen, are electro-positives. The other theory accounts for all the phenomena of electricity by physical action, by a certain force set free during chemical action. When we decompose zinc, we set free a positive energy that before was the combining force holding the particles of zinc together in their peculiar position. This force is not a fluid passing through the conducting wire, but acts upon the first particle of matter, that acting upon the second, and that upon the third, and so on through. Mr. Holcomb's method uses a permanent as well as a temporary magnet. Assuming the

power of the electro-magnet to be two, and of the permanent magnet to be four, it would seem that the power of the two combined should be six; but instead of that we find it to be sixteen. It would seem from Faraday's law, that the decomposition of a certain amount of zinc will generate a certain force, that with the combination there should be a greater consumption of zinc; but while he had, by trying it over and over again, ascertained beyond all possible doubt, that the power was thus increased, he had been unable to determine whether there was really any more zinc used.

Mr. Johnson stated that by placing a galvanometer between the battery and the magnet, it appeared that the magnet did not act apon the battery at all.

Mr. Dibben said that it might be that the resistance at the end was overcome, and that there was a faster current although no stronger. He could not conceive of any other rational explanation of the increased power than an increased consumption of the zinc.

Mr. Holcomb exhibited specimens of chemical electro-magnet printing, a mode which has now nearly gone out of use. As the time required for the printing is less than that required for manipulation, perforated paper is used to complete and break the circuit, the paper being prepared by operators, and passed rapidly through the instrument. He had devised a new method of preparing chemical paper, by freeing it from glutinous matter and then wetting it with a solution of the nitrate of silver, which is much more sensitive than the prussiate of potash. The impression is fixed by dipping the paper into the iodine of potassium, which changes the nitrate of silver into an iodide of silver. As to his invention, now before the Committee, he had been for some time very doubtful of the fact of the increase of power, for the reason that there were no known laws to account for it. The nearest experiment made by others, was that of Prof. Faraday, of placing a permanent magnet in a coil, and endeavoring so ascertain whether it produced any effect upon the current. Professor Faraday thought it did not.

Mr. Johnson said that it was Oërfted who discovered that when a needle was brought into proximity to the wire, it was deflected to the east or west, depending upon its position above or below the wire. Ampère afterwards increased the number of turns and made it available as a multiplier. He proceeded to

give an account of experiments in telegraphing which he had made in 1837. He had put up a wire, three miles in length, in a yard, crossing back and forth, and found that a single drop of acid would act through the wire, the entire amount of the wire being uninsulated. It had previously been supposed to be necessary to wind it. He had tried various methods of recording, by sand, by iron filings, and by ink.

The President remarked that the Chinese claim to have used the magnetic needle as a means of guiding their wagons long before they had any roads. It seemed remarkable that a power so long known had never been made available for any other purpose, excepting to find a protection against it in lightning rods, than as a means of carrying messages.

Mr. Bliss suggested that it was used medicinally.

The President replied that it had not secured the assent of the medical profession.

Mr. Johnson said that electro-metallurgy was now taking a very wide range in the arts.

Mr. Holcomb said that the great difficulties in telegraphing were the adjustment of the relay magnets; and the interference of other powers beside that of the battery, as electricity from other sources. If some means could be devised to discharge the induced electricity, or opposite electricity, from the outer coating of the wire, it would very much facilitate telegraphing. These difficulties are so great and so variable that it is impracticable to work with repeaters. For very long distances, it was found to be necessary for some person to be continually adjusting the relay magnets; and the result had been that the repeaters had been laid aside, and the messages were now repeated with the fingers.

Mr. Veeder suggested that if the action of the current is vibratory, it would require liberty of the wire; and there might therefore be an advantage of passing the wire loosely through insulating tubes at the poles.

NEW STEAM BRAKE.

Dr. Vander Weyde, in behalf of the inventor, exhibited drawings of a brake for car-wheels, to be operated by steam from the locomotive, and capable of stopping the train within a distance of sixty feet. Dr. V. remarked that, without having investigated it, he should think it dangerous to apply such a brake. The

inventor proposes to use the steam also to warm the cars. He also adds a hook to the locomotive, so that the engineer can hook on cars or release them at will. He asked for a committee to investigate his inventions.

Mr. Dibben said that a train moving at the rate of forty miles an hour could not be stopped within sixty feet. The Creamer brake, operating by a spring, was effective in stopping the train as quickly as was compatible with safety.

The President said that stopping a train moving forty miles an hour within three hundred feet, was as much as could be borne without the destruction of the train itself. This had been ascertained by experiment upon the Hudson River Railroad.

Mr. Dibben said that this corresponded with the experience of other countries.

Adjourned until Thursday evening March 14.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
March 14, 1861.

Professor Mason in the chair.

PLOWING THE PRAIRIES.

Mr. Jesse Frye exhibited the model of a "steam horse of-all-work," and a series of gang-plows, especially intended for plowing the western prairies, which he exhibited at the meeting of the Farmers' Club, upon the 11th inst. The principle of the plow is intended to avoid both bottom and land-side pressures. The track of the wheels is plowed up after they pass, leaving the whole surface of the land perfectly light. By plowing from twenty to thirty-four feet wide, the expense of plowing is to be very much reduced, but three men being required to plow one hundred and sixty acres per day. The subject was referred to a committee, consisting of Messrs. Butler, Dibben and Johnson.

RAILROAD AXLES.

Mr. Sanderson exhibited a model of a bearing for machinery, and especially for car-wheels, so formed that a single supply of oil will last for an indefinite period. Cars may run thousands of miles with one oiling.

MECHANICAL PUZZLE.

Mr. Smith exhibited a model of two wheels, one of twice the diameter of the other, so connected as to revolve in the same time.

Mr. Seeley said that the number of teeth was the same in both, and there was some slipping.

COTTON.

The President exhibited a specimen of the yellow cotton, brought originally from China in the form of nankeen. It was transferred to Georgia; but it was found that it intermixed with the white cotton, so that its cultivation was laid aside. Its fiber is light and short, rather more twisted than that of ordinary cotton. A specimen of cotton purporting to come from Peru, upon microscopic examination proved not to be a true cotton, the fiber not having the screw form. In the Astor library he had found the English Parliamentary reports complete from the day they commenced printlng their reports down to the last session. Commencing with the volume for 1836, in which are the first reports relative to the cotton culture in India, he had carefully examined all the reports to 1846, and would proceed to examine those subsequently made.

In the first paper upon the subject, the success in the culture of American cotton is attributed to the high intelligence of the overseers, mentioning also the peculiar adaptation of the very slender fingers of the creoles for taking the cotton cleanly from the pod. After various experiments, at enormous expense, in the East Indies, for ten years, it was advised that the cotton produced, on account of the inequality of the length of the staple, and its extreme tenderness, be sent to the Canton market, being unfit for the British market. The failure was attributed, first, to the utter incompetency of the natives to be trained to neat and orderly work, and they say that nothing but the most strict oversight and perfect authority of the men who command over those that do the labor, can produce anywhere a successful crop to compete with the American cotton. The second difficulty was their periodical rainy and dry seasons; whereas here the Blue Ridge, extending from New York to Texas, is a regular provider of rains through all the period from the planting of the cotton until it is fully ripe, and the cotton region rarely suffers from drought. Another remarkable fact is, that while the cottons

here improve under culture, in India they decline with improved culture. The reports also confirm the statement that the perennial cottons are unfit for the market, and the culture of the cotton tree has been abandoned.

Dr. Stevens said that the characteristics of cotton may be best understood by considering its object, which is to preserve and distribute the cotton seed. The cell of the fiber is originally hollow; but collapses, which gives it a twisted and flattened form, thus introducing more air into the mass. One function of the flax fiber is to transmit silica to the plant. The silica is transmitted in the form of silicate of potash; and when the silica is used the potash is deposited between the cells of the fiber, or even within the cavities of the cells. The cotton fiber has no occasion for the introduction of silica or potash into it; and this is a radical distinction between the two. The cotton fibers radiate from the seed like those of the dandelion; and the consequence is that those on the same seed are all of equal length, giving it a uniformity of staple. Indeed all the cotton in the pod that ripens at the same time will be of equal length. From the peculiarity of the soil and climate of the United States, the seeds ripen almost simultaneously over a large extent of country; and all the cotton ripening upon the same day will be of equal length. During its growth, cotton requires an alternation of showers with hot weather; but when the pod begins to break, it requires a period of dry weather. Owing to the Appalachian system of mountains, these wants are supplied. The African continent, in its geographical and geological features, is more similar to the North American continent than any other upon the globe. In the interior of Africa, the cotton can be planted as successfully as in some portions of the United States; and probably there will yet be a cultivation of cotton in Africa second only to that of the United States. The uneducated labor of Africa is capable of raising about one bale of cotton to the individual. In the Southern States, the half-intelligent African is able to raise about three bales to the individual. But the intelligent German, upon the same soil and under the same circumstances, is able to raise about six bales to the individual; showing that it is intelligence after all which produces most cotton upon a given soil.

The President remarked that he should suppose from the ap-

pearance under the microscope, that the cotton fiber grew in the flattened form.

Mr. Haskell stated that cotton is extensively cultivated in Brazil, where there are about 4,000,000 blacks, who can be taught to cultivate it.

Mr. Nash said that the difficulty in the East Indies is, that the climate is divided by the monsoons. The plant is well started by the rain of the first monsoon. Then comes the sirocco, when it needs rain; and in the fall, when it needs dry weather, the monsoon comes, and the rain is so violent as to destroy everything. The Allegany range of mountains stops the trade winds, as the coast stops the tides; and the currents of air are deflected northward like the Gulf Stream, producing a climate such as is found nowhere else. In Eastern Africa and in Brazil there is an approach to it, and cotton can be cultivated there; but it will be an inferior article. The electrical influences of the earth which affect this question are very unevenly distributed. Gold brought from Australia or Africa has no crystals; while American gold is full of them. He did not believe that any white man could grow as much cotton as a black man with a white man over him.

Mr. Seely remarked that the specimen of Peruvian cotton was probably from milkweed, and came from Peru, Ill.

Mr. Bartlett said that he should wish, when the question should come up again, to make some statements and to correct some erroneous statements which had been made to-night.

ELECTRIC TELEGRAPH.

Mr. Dibben said that he had not yet reached any satisfactory solution of the question of the origin of the additional power in Mr. Holcomb's combination of the permanent and electro-magnets. With a battery force of two, and a positive force of four from the permanent magnet, upon combining the two the sum is not six, but about twelve, as shown by his latest experiments. So with other proportions. If the sum of the two forces, taken separately, is ten, taken together it will be about doubled, or twenty. He could only account for it upon the supposition—which, however, he was not prepared to accept—that the presence of the permanent magnet permits a quicker passage of a given battery force through the coil, and thus a greater force is generated in the battery by the consumption of a greater quantity of zinc.

Mr. Smith said that any two magnets would react upon each other when brought near together, and thus there would be a greater combined force than the sum of the forces of the two acting. separately. The telegraphing apparatus of Mr. Hughes adopts the principle of using a permanent and an electro-magnet in connexion with each other; and many other experimenters have used the same feature.

Mr. Churchill said that two permanent magnets, with a separate force of four each, would give a greater force than eight when combined. He suggested, as a reason, a molecular change produced in the steel. It has been found that soft iron, subjected to the influence of the Rumhkorf coil, becomes so hard that it cannot be filed; whereas, upon removing it, it becomes soft again.

Mr. Eddy stated that Mr. Hughes merely neutralized the permanent magnet with the other, but did not make the two currents flow together, as Mr. Holcomb did.

Mr. Dibben said that he had alluded to Mr. Hughes in saying that something similar had been done, but not the same that Mr. Holcomb accomplishes.

Dr. Van der Weyde explained more fully the action of magnets upon each other. Take four steel magnets, carrying two pounds each, and put them together, and, instead of eight pounds, they would only carry about three pounds, because the similar poles being placed together counteract each other. It is not possible to have a power out of a combination of horseshoe magnets equal to the sum of them all. In an electro-magnetic machine with seven magnets, each carrying alone sixteen pounds, the seven could scarcely carry fifty pounds. But if the magnets are placed end to end, the force will be more than doubled, for they react upon one another.

The President.—Does this submit to Carnot's law?

Dr. Vander Weyde replied that he did not question that, but that there were some peculiar circumstances not to be overlooked in the influence of the magnets upon each other.

Mr. Dibben did not question the facts, but asked for the cause—whether it arose from an increase of battery action.

Mr. Smith and Dr. Van der Weyde stated that the battery action is increased.

The President.—That brings it within Carnot's law.

Mr. Seely gave a historical account of various steps in tele-

graphing, commencing with the discharge of a current of electricity through four miles of wire, by Dr. Wilson, in 1747, and described the various methods attempted to be used; the signals being made by a pith ball, by the flashing of gunpowder, by the electric spark, by the decomposition of water, by the deflection of the magnetic needle, and some using 24 wires. Upon one plan two clocks were to be used, going equally and marked with letters, the signal indicating the letter to which the index should point at the mement. As to Mr. Holcomb's invention, he should be disposed to add his name to the list. It may be that there is no increased consumption in the battery, or that the result may be explained by the concentration of the power where we can use it, being moved outward from the central portions of the magnet. There may be really no more force, but, being shoved along to the end, we may be able to usè more of it. In our ordinary operations we do not utilize all our power.

Mr. Holcomb believed that his combination of the electro and permanent magnets does not increase the consumption of the battery. The best proof of this is that a galvanometer placed in the circuit will not be affected by the action of the permanent magnet. The method of Ampére, deflecting a magnetic needle, was a combination of a permanent and an electro-magnet. Merely combining the two was not new. It was merely his peculiar combination which he supposed to be new. In former combinations, the power deduced is only the power of the electro-magnet without the permanent magnet.

Mr. Bartlett said that it was owing to the support given to Professor Morse by the American Institute that he was enabled to bring his invention before the public, and thus to introduce a practical American telegraph.

Adjourned until half-past 7 o'clock on Thursday evening, the 21st instant.

American Institute, Polytechnic Association,
March 21, 1861.

Mr. Wm. Lawton in the chair.

TRANSVERSE HARROW, SEED SOWER AND ROLLER COMBINED.

Edward Badlam exhibited and explained a beautiful model of a new agricultural implement with the above title. It has a single wheel in front and a large roller in the rear. It is drawn

by two horses. A transverse box or trough in front contains the seed. (Another similar one in the middle may contain grass seed.) Just behind the front seed box is suspended near the ground, a case of harrow teeth, and, as the machine moves, the teeth operate transversely in the soil. There are six rows of teeth, and they may operate all together, or one-half of them in an opposite direction to the other half. The harrow being suspended at four corners, it yields to obstacles and unevenness of surface. The teeth keep themselves clear, and pulverize more thoroughly, it is claimed, than the common harrow. A boulder causes no breaking of the teeth, because they yield. The driver can throw the harrow out of gear. The machine has been tried in Ogdensburg. The inventor thinks the draft is fully as easy as the common harrow. It was patented only last fall. There is no other machine combining the harrow, seed sower and roller. It is said to do three days' work in one. It will be retailed at about $100. The working machine is four or four and a half feet wide, and weighs from 700 to 800 pounds. The roller may be made in two sections. No part is liable to get out of order. The model exhibited is a quarter size, and was made by the inventor. (A member pronounced it the best model he had seen exhibited before the Society.)

The Chairman remarked that it was very important to submit such machines to scientific institutions, from the fact that the farmers who invented them were frequently deficient in mechanical knowledge, and a few practical hints might save them great expense and loss.

CLOTH-WRINGER.

Mr. Stetson.—There have been a great many efforts to invent machines for wringing cloths. Some hundred patents have been granted for washing machines. The wringing machine is a later invention. The English wringer consists of rollers of wood, with no yield except from an elastic bearing. But in the passage of a bunch of clothes, while the thicker portions would be pretty well squeezed, the thinner portion would remain dripping wet. Mr. S. then exhibited an American invention, which he said was practically uniform in its operation, and introduced as the inventor,

E. Dickerman, of Middlefield, Conn., who explained the operation. The machine may be screwed to a wash tub. The two rollers through which the clothes are passed are of india-rubber,

with an axis of iron. An iron axis three-quarters of an inch thick is driven through a hole half an inch in diameter in the india-rubber roller, and cemented therein with dissolved rubber. Once passing through is sufficient to expel the water from every part of the cloth, thick or thin. The inventor says that he can wring out a sheet before a washwoman can get it ready for wringing. No guiding is required. A girl of ten years can turn the crank and wring out a washing. It has only been perfected a short time, and it has sold rapidly. In almost every instance where they were left on trial in Middletown they were afterwards purchased. The inventor does not claim the rubber rollers as new, but what he does claim is the use of wooden rollers outside, or above and below the rubber rollers; and he has also a claim pending for the clamping process. The wooden rollers press against the rubber rollers above and below, and have a sliding block for the bearing; also a spring that allows the rubber rollers to yield. The price of the largest size machine is $10, intended for hotel use; the next size below, $8; and a small size will be made for $5.

Mr. Seely.—I think this a very admirable machine, and suggest that it may be useful for other purposes than wringing. I think it would be good for copying letters; also for mounting pictures upon cards. There is a great deal of such work done by photographers. It might also make a very good washing machine, by immersing it in a tub of soap suds and passing the clothes back and forth through the rollers. Successful washing consists in getting soap suds in and soap suds out of the cloth. But rubber will not stand soap or grease; and even hot water will injure it. Again, I think this machine would be specially applicable to washing photographs. The chemical substances must be removed from photographs or they will fade. Their durability depends upon the extent of the removal of those substances. They are usually washed twelve hours. With this machine they could be as thoroughly cleaned in ten minutes. By passing the photograph through once, you will remove nine-tenths of the noxious material; by repeating it, you will remove ninety-nine-hundredths; and so on.

Mr. Dickerman.—I have experimented on the machine as a washing machine, and have found it successful, washing the clothes entirely clean without rubbing.

Mr. Johnson.—My experience has been that nothing short of

rubbing will answer in washing; the machine here exhibited is a rubbing, washing machine.

Mr. Seely.—The trouble with machines is that they do not dislodge the fluid on the inside.

Mr. Stetson stated in the four most popular washing machines; the Metropolitan, the Cataract, the Union and the Conical the clothes are not rubbed together.

Mr. Dickerman.—There have been no clothes rubbed in my house since November.

PROJECTILES.

Mr. Stetson.—Several years ago it was my privilege to show a projectile which has done the best execution, viz: B. B. Hotchkiss' patent ball. The ball is in two pieces, united by lead, flush with the surface. When discharged, the first effect of the powder is to drive forth the back portion and to force out the lead at the sides against the internal surface of the cannon. The back portion shuts over the front portion, and the lead between is only half an inch thick. The print of the internal surface of the cannon is shown in this ball (exhibited, weighing 15 lbs.), which was fired into a soft substance. On the 19th of February, a target nine feet high and six feet wide was fired at at a distance of 1,000 yards—a good fair distance for rifled cannon practice, and here is a diagram showing the result. Out of seven shots six struck the target, the seventh just clearing the edge; and three of the shots hit within a space 16 inches square in the center. The cannon was of iron, weighing 650 lbs.; elevation, $3\frac{1}{2}°$; weight of ball, $5\frac{1}{4}$ lbs.; quantity of powder, $5\frac{1}{2}$ ounces.

Numerous other diagrams were exhibited of the results of other trials.

ALCOHOL.

The Chairman wished to call the attention of the association to the consideration of alcohol in conection with the agricultural interests of the country. There is a vast deal of grape culture for producing wines, and from wine brandy is distilled. He wished to have some light upon the question of the effects of alcohol upon the human system—particularly whether there is any difference when taken in the form of brandy and when taken in the form of wine, and combined with the vegetable products; and whether, in the latter form, or in any form, it is healthful or otherwise. It is maintained by many that brandy made from the

grape is no better than other alcohol, and that its peculiar flavor is due to the ingenuity of dealers. He was unwilling to believe that the world had been thus far cheated into paying from $4 to $6 a gallon for such an article. It is true that brandy, when taken into the stomach, acts like carbon, and suspends hunger and vitality without being digested. Is that the effect of poison? Is alcohol absolutely a poison? And what difference is there in its effects when combined with vegetable products in the form of wine?

Mr. Enos Stevens upon the introduction of Mr. Dibben read the following paper bearing upon this question, being the result of certain investigations made by himself while employed as clerk for the Massachusetts Commissioners on Sanitary Survey, more particularly as to getting up an instution for feeble minded persons. Among other conclusions arrived at were these: that alcohol is not a producer or furnisher of nervous stimulus, but an irritator; that it is the most virulent poison in nature, and never tends to cure; that the use of one gill a day of commercial proof liquor, whether drugged or not, wastes about ten per cent of the strength and activity for to-morrow.

CONSUMPTION OF ALCOHOL BY THE HUMAN BODY.

The use of alcoholic drinks has now become so frequent and abundant by so great a portion of mankind, that I think it is a proper subject of investigation by an association of persons organized exclusively to study, invent, experiment with, and scientifically report on mechanical constructions and operations; especially because alcohol now commonly so much affects the success of the workings of the wonderful machine, the human constitution. I now propose to discuss the economy of consuming alcoholic substances by the human body, by contemplating the subject in the same manner as we usually examine the comparative advantages or injuries of different kinds of lubricating substances on machinery, or different kinds of fuel for steam power. The facts and theories that I propose to rely on are mainly drawn from the "field notes" of the Massachusetts commissioners' great sanitary survey in 1847 and 1848, in which the writer was traveling clerk and assistant examiner, wherein about 400 families and all their kindred to the fourth degree of consanguinity, were reported to the Legislature, with all their ascertainable different conditions and habits of body and mind.

Whatever we consume in the stomach, whether fluid, liquid, or

concrete, I have denominated food, whether good or bad, for nourishment or nervous stimulus.

FOOD.

The only proper materials for human food are such vegetable and animal substances as taste pleasantly, and are in the same state of organization in which they were in the healthy living vegetable or animal in which they grew. But when any material intended for food has been operated on by any destructive chemical analysis, or by any dissolution of the organic fibers or particles that united the various ultimate constituent elements they contain, such as combustion, fermentation, putrefaction, evaporation, or dissolution, then it cannot be successfully digested and used in the activity, growth and repairs of healthy animal life. That is, our animal growth and repairs must always be made up of organic fibers, or particles, but never of ultimate atoms. Hence digestion is a peculiar vital operation, more like mechanical disintegration for re-arrangement than like chemical dissolution of the finest fibres or particles to their ultimate constituents of carbon, oxygen, and hydrogen, &c.

In pursuance of this theory, we should not, for food, use soda nor potash, because they are extracted from vegetables by the totally destructive analysis of fire; nor use vinegar nor tartaric acid, for food, because they are obtained only by the destruction of vegetables by fermentation; nor carrion of beef or fish, nor rotten vegetables, because the integrity of their organization has been destroyed by putrefaction; nor nourish ourselves with alcohol, because it has been extracted from vegetable substances by both analytical fermentation, and evaporation, or double elective affinity; nor feed on morphine nor quinine, because they have been dissolved out of vegetable organizations.

Cooking, when resorted to, should always be done in such a manner as only to disintegrate, or soften the concretion of the fibres or particles of food, merely to assist the mechanical operations of pulverization and soaking in the mouth; but never to dissolve nor otherwise disorganize the particles that make up the constitution of vegetable and animal substances, nor tend to reduce them to their ultimate elementary chemical atoms, such as oxygen, hydrogen and nitrogen. If vegetable and animal substances thus cooked do not taste agreeably, they would not be nutritious nor stimulating by mixing energetic chemicals, nor by submitting them to disorganizing analysis by much fire.

But whatever we take into the stomach, whether good or bad food, must be either immediately absorbed from the stomach and poured directly into the blood, as in case of water, oil and alcohol; or the food must be disintegrated, digested and absorbed from the intestines into the blood and thence circulated into every part of the body; otherwise the food would soon sour in the stomach, and then we would soon vomit it forth, or else eject it down through the intestinal canal in diarrhœa. After the vital functions have taken out of the blood whatever it can use to advantage in the maintenance of the body, then all the remaining materials in the blood must be circulated round and round the circuits of the veins and arteries, until either temporarily stored in morbid muscle or adipose fat, or else excreted and cleared out before they ferment or mortify in the body.

When the waste of the plethoric system, and the excess of good and bad food is excreted very much through the lungs in breathing, or coughing up phlegm and the discharges of pustules, then fœtid breath, consumption, bronchitis, phthisic or diptheria monopolize the lungs, rather than normal breathing and the oxygenation of the blood. When such excretions mainly escape into the stomach or intestines, then dyspepsia or diarrhœa ventilates the ill-fed body. But when such excretions of disorganized materials persistently tend to escape through the skin by morbid perspiration, then the skin is soon corroded into such scrofulous conditions as salt rheum, erysipelas humors and boils; none of which can be cured while the invalid continues to cultivate them by either excess or bad selections of food, or by indiscreet labor, or by exposures to extremes of climate. Finally, after the morbid muscles and soft adipose fat, temporarily formed and stored up from disorganized materials of food, have accumulated and lasted about six or eight weeks, then the force of ordinary vitality can fully control and preserve the putrefying and fermenting substances no longer; and now fœtid breath, cold perspiration, coughs, diarrhœa, humors, boils and febrile excretions ensue to disencumber the body of imperfectly organized accumulations; or else they entirely consume the vital powers and life ceases.

Having briefly considered the general operations and effects of food, whose particles have been somewhat disorganized by the various modes of destructive analysis, I propose hereafter to confine my remarks more directly to the consideration and excretion

of alcoholic substances. Alcohol does not exist in the constitution of healthy vegetable organization, no more than mortar is found spontaneously existing in nature; but alcohol is formed by a certain manner and amount of fermentation of certain parts of vegetables. The alcohol may be separated from the other debris of fermentation by moderate heat, and then condensed into liquid. This condensed alcoholic liquid usually contains some water, and also more or less of the fermented essential oils of the vegetables used, thereby transformed into fusil oils. After the proper vegetable substances for generating alcohol have been fermented, and the alcohol formed, but before it has been evaporated from them, then the mass of fermented vegetable substances is either beer, wine or vinegar, according to the selection and management of the substances used, but either may be manipulated to yield its alcohol, and then the remainder will rapidly go into disorganizing putrefaction.

But after alcohol has been formed by fermentation, and separated from some of the other vegetable debris by evaporation, and collected by condensation into liquid alcohol; then the alcohol may be dissolved by either of the strong mineral acids, viz: sulphuric, nitric or chloric acids, and then sulphuric ether, nitric ether, or chloroform are formed, and may be collected while escaping in vapor, and condensed for concentrated storage. Ether manifests most of the effects of alcohol; but is as much more concentrated than common alcohol, as common alcohol is more concentrated than beer, wine, or vinegar.

Ordinary alcohol is not disposed to run spontaneously into putrefaction, as would the other elements of beer, wine and vinegar, after the alcohol is eliminated; but it rather tends to prevent putrefaction, not only in beer, wine and vinegar, but in almost all vegetable or animal substances immersed in it. Moreover, alcohol, and its frequent concomitant, fusil oil, dissolve many vegetable and animal substanccs, and ether dissolves many more.

Having now revived or renewed our acquaintance with the history and habits of alcohol in several of its various forms, we are somewhat prepared to notice and record its progress and effects in the human constitution, whether swallowed into the stomach, or absorbed through the skin from bathing, or inspired with the breath in vapor through the lungs. As soon as alcohol has been swallowed, it immediately mixes with the contents of the stomach

and begins to dissolve them into disorganization; and also to attack the inner coating of the stomach by irritating dissolution, and thus aggravates the stomach into more violent peristaltic agitations, to hasten the disintegration, and the piloric discharge of its contents down the intestinal canal. But in the meantime the direct percolating pores or ducts from the stomach, to that main vessel, that pours the new made nourishment into the heart, proceed to gather the water and oil and alcoholic contents out of the stomach, and to pour them into the blood in the heart, without having been formally digested. By this means, alcoholic beverages are almost immediately conveyed into the general circulation of the blood; although food, which has to be regularly digested and assorted along the intestinal canal, requires several hours to reach the heart. From the heart, the bloody alcohol is projected into the lungs and returned to the heart, and thence projected through all the arteries and veins of the body. By the time the alcohol has reached the arteries and veins, and circulated through the system it has become much diluted; yet it still continues to irritate the inner surfaces of the blood vessels, aggravating them into more violent vermicular action of their muscles; and as they are valved against flowing backwards, they now project the blood forward with much more force and rapidity than it would otherwise have flowed.

While the blood is thus rushing through the glands of the mouth, far more and stronger saliva is formed to taste and moisten the food: through the stomach, more and stronger gastric acid to disintegrate our food; through the liver, more and stronger gall to finish digestion and separate the nourishment; through the lungs, skin, kidneys and alvine glands, more of the wastes and incumbrances of the body are ejected and cleared away from incumbering the system; and through the glands along the sides of the arteries into the nerves, for more nervous stimulus is generated per hour and transmitted into the nerves, and stored up under the control of the mind for any required use of the mental and physical powers and operation of the constitution, both for the happiness of the present generation, and for the propagation of those then about to be.

Having described the generally admitted theory of alcohol on the body, I now proceed to consider the practical questions of facts as to the utility of alcoholic beverages and medicines.

First, Is alcohol a furnisher or producer of nervous stimulus,

or is it only an irritant? The result of this writer's experiences, observations and inquiries, indicates that it is not a furnisher nor producer of nervous stimulus, but that it is only an irritant, arousing and consuming, in one portion of time, the vital and voluntary energies of the system, that would have otherwise lasted twice as long; making one excessively active for a short time, and then leaving him for a time very exhausted and inefficient, until recruited. The loss of practical efficiency on account of every gill of common proof alcoholic liquor consumed by the body in one day, by furious, wasteful, extra speed of vital and voluntary action, instead of normal rate of living, is 10 per cent.

Second, What are the remedial effects of alcohol? Alcohol consumed in the stomach, not having been chemically combined nor analysed in the stomach nor in the circulation of the blood; therefore when it is filtered as a part of the saliva into the mouth, it irritates and vilifies the nerves of taste, somewhat as it makes the eyes smart, and hence makes the experimenter crave abnormal food, or food in excessive quantities, or even eschew the best normal substances. When it circulates into the stomach the alcoholic gastric acid irritates the stomach to morbid cravings and fatiguing dissolutions of food, instead of being contented with normal moderate digestion. By the escape of alcohol as a part of the excretions of the breath through the lungs, the lungs are diverted from their normal aerialization of the blood, to discharging morbid excretid in foetid breath, coughed up phlegm and the scrofulous discharges of pulmonary diseases; which first cultivate and then blight the bacchinal blossoms on the nose. Where the alcoholic excretions are too abundantly escaping through the skin, there the skin is irritated and corroded into salt rheum, erysipelas, and other scrofulous outlets of the violations of health, as humors and boils. But when the alcoholic potations come to be excreted from the blood vessels into the adjacent nerves and the brain, then the nerves and faculties commonly most and openest used, now first close up by internal irritation and swelling, and then mental and nervous activity goes on mainly in only the drinker's weakest and least used faculties of mind and body, and without his ordinary moral and physical energies and restraints; and he cannot then even successfully grow, rest nor repair his system while containing alcoholic substances.

Moreover the incipient germs of males, and the forming

embryoes of females, adapt themselves to the alcoholic excretions of both parents, and hence organize with wide scrofulous discharges of alcoholic substances, often ripening into the worst diseases, both before and after birth. Of all persons living in wedlock, about twice as many males as females abuse themselves by using alcoholic or fermented liquors; and whence it is found that about two-thirds of the cases of barrenness, miscarriage and diseases of pregnant females, are the spontaneous, morbid, inherited, scrofulous results of the father's abuse of health by drunkenness, rather than the cultivation of poor health by the mother. Indeed, all alcoholic, scrofulous diseases, whether inherited or cultivated, are nature's best outlets of ventilating the violations of cultivated or inherited poor health; and cannot be relieved by any medicines while the invalid still continues to drink and cultivate them.

As to the utility of alcoholic solvents to prepare medicines, the conclusion arrived at by the writer of this paper is, that alcohol is the most virulent poison in nature, and that all drugs and medicines that can practically be mingled with it for beverages or medicines, only dilute and weaken it. Still, it is admitted that other poisons may mercifully kill one quicker than alcoholic beverages, yet alcohol is usually the most cunningly malicious, of all drugs or medicines. Different drugs mixed with alcohol produce different effects, but none worse than alcohol. Furthermore, it is concluded that no medicine, characterized like alcohol by fermentation, evaporation, or dissolution, ever tends to cure in any circumstances whatever; but on the contrary, that the divine principle of vitality is constituted to sustain, retain, or maintain good health, intelligence and happiness of body and mind, provided we allow ourselves normal habits and conditions of animal life, and not only better without these medicines than with them, but even often in spite of the daily use of very injurious drugs and weakening habits.

And finally, the use of one gill to-day of commercial proof alcoholic liquors, whether drugged or not, usually wastes about ten per cent. of the drinker's strength and activity for to-morrow, for either doing or enjoying the duties and pleasures of life, so that he becomes ten per cent., for every gill consumed to-day, less efficient than he otherwise would have been to serve with his whole strength, either himself or his employer, or God or the devil. The other physiological and moral equivalent misdemeanors,

each of which debilitates and depraves its devotee, as much on the morrow as consuming one gill of alcoholic spirits, or one-tenth of his constitutional capabilities, are, chewing half an ounce or smoking a quarter of an ounce of tobacco per day; or one gill vinegar, or one pint strong beer, wine, ale, porter or lager beer; or one quart ice-water, small beer or soda water; or four ounces pickles, ice-cream, molasses, sugar or candy; or one ounce lard, whether in gravy or pastry; or half an ounce of carbonate of soda or potash, either in drinks, bread or bathing; or one tenth of an ounce of salt-petre, or sulphur; or consuming one pound yeast in fermented bread, instead of unleavened bread; or one pound of much cooked meat, instead of as little cooked as would be most palatable; or every fifteen minutes sexual, erectile excitement; or every consummation of sexual excitement, whether by natural excitement or self-abuse; shivering in the cold one hour for every degree below normal temperature; breathing one-tenth of breath of consumed air, instead of pure atmosphere; every hour's neglect of at least four hour's per day of necessary general muscular labor; or every hour's violent excess of labor for exceeding every tenth of his normal working capacity; or every tenth of his daily allowance of food, more or less than by normal quantity; or every hour's loss or excess of his usual necessary sleep.

Moreover, every day's disobeying and offending his enlightened natural instincts, otherwise called the fretting or demoralizing each and every moral impulsive sense, debilitates, deranges, weakens, brutalizes and unmans him for the morrow's cares, labors and enjoyments, ten per cent.; which is each intemperately equivalent to drinking one gill of alcoholic spirits per day. Especially such violations of natural honesty as lying, or irrelevant remarks; or mistaking suppositions or observations, against normal *imagination:* Buffoonry, or absurd fancies and plans, against *novelty*: Filthiness or obscenity, or excessive refinements, against *ideality*: Despondency, or absurd hopes; or reading silly liteerature; or praying longer than the examples and precepts of Christ require, against *hope*: Remaining in great danger to self, friends or business; or in any unpleasant circumstances, when there is opportunity for relief, against *cautiousness:* Neglecting to conceal one's own affairs from competitors or enemies; or concealing them from assistants and friends, against *secretiveness:* Want or excess of energy; or pursuing vengeance instead of overcom-

ing current obstacles, against *impetuousness:* Theft, begging, gambling, extortion or idleness, against *acquisitiveness:* Following inferior or poor plans of work, using bad tools or mechanism; or mere exercise instead of necessary labor, against *constructiveness:* Injury, severity, neglect; or indiscreet assistance to any sentient being, against *beneficence*:. Unnecessary oddities, or servile imitations, against *conformity:* Disrespect against, or servile respect to, any person; or neglect of divine institutions, against *subordination:* Harsh, imperious efforts against persons or animals, in exercising influence over them; or shrinking from exercising proper authority, against *authoritiveness:* Negligence of enlightened popular conduct or deportment; or extorting honors and compliments not merited or voluntarily bestowed, against *approbativeness:* Indecision, or procrastination, after reasonable intelligence, or premature determinations, against *conscientiousness:* Bigotry; or frequent changes of habits or purposes, against *firmness:* Home-sickness, or frequent migrations, against *local attachment:* Lonesomeness, or abuse or neglect of acquaintances, against *social attachment:* Fondling dolls, or petting cats, dogs, birds; or cultivating unprolific flowers, whether botanical or zoological, instead of raising children, against *parental attachment:* Self-denial of the conjugal society of one spouse, or the monopoly of the society of every additional spouse besides the first, against *matrimonial attachment.*

Mr. Koch stated that it was found in Russia, where he had lived many years, that alcohol was absolutely necessary for the sustenance of life.

Mr. Stevens, in reply, cited the fact that the Esquimaux had not the means of distilling alcohol. He also stated that one-quarter of all the idiots in Massachusetts were the offspring of very intemperate parents one or two years before the transmission of the germ.

Dr. Reuben maintained that alcohol was alcohol, no matter how combined with other ingredients. Alcohol in wine will produce the same effect as pure alcohol, diluted or otherwise, except so far as it is modified by the presence of some other substances. Strong coffee will neutralize, to some extent, the effects of alcohol. So will certain vegetable acids. To his own mind it was not proven that alcohol is always injurious, though its general effect is to contract animal tissue. This could be shown by putting a piece of flesh in alcohol; and in post mortem examinations, the

effect of alcohol on the brain was seen in the diminution of its size, and in some cases the filling of the enlarged cavities with that fluid.

Mr. R. L. Pell.—Man's wants are progressive. The history of intoxicating liquors is full of melancholy interest, as much so as the narcotics in general use. For the necessities of man God has thus provided. With the English and American nations, beef and bread are the staples. And in all countries, no matter what the staple commodity may be, they contain the same quantity of gluten, starch and fat, and in precisely the same proportions. Therefore man cannot help but adjust to his requirements such food as will supply the chemical wants of his body, which is precisely the same among all people.

When man desires to free himself from unpleasant reflections, he makes use of fermented liquors, whether he be civilized or savage. All men have discovered that intoxication will secure for them present happiness, and future misery. Some use the sap of the palm tree, aloes, sugar cane, and honey; others, the liquor obtained from the pear, apple, grape; the malt from grain, and the milk of the mare—all of which produce alcohol, and consequently all have the same effect. After a time man tires of these, and calls to his use the aid of narcotics, which multiply his enjoyments.

The inhabitants of South America were probably the first to roll up the leaf of the tobacco plant, and enjoy the reveries of smoke, ages before Columbus first saw the light. The Indian natives were the first to chew the leaves of the cocoa; the Asiatics hemp, opium and betel-nut; the South Sea Islanders the pepper; the inhabitants of the Andes thorn-apples; the northern Europeans the hop. As from different plants intoxicating drinks were obtained, so from different plants narcotic substances have been extracted. The first produces precisely the same effect upon all mankind. But each individual narcotic produces an effect peculiar to itself, whether it be the opium, tobacco, hemp, cocoa or hop, and they all hold an important position in the chemico-physiology of life.

Tobacco is used among the greatest number of people on the earth; then comes opium, followed by hemp. In 1492, Columbus found tobacco generally used in Cuba, and when Cortez entered Mexico, he was regaled by the cigar. In 1560, Nicot carried it to France; in 1586, Sir Francis Drake introduced it into Eng-

land; in 1601, it found its way to Java, since which time its cultivation and use has spread over the world. It grows well from the fiftieth degree of latitude to the equator, but best within thirty-six degrees on either side of it; and next to salt, it is the single article most extensively used by man. Notwithstanding King James used to say, "that it was hateful to the nose, loathsome to the eye, hurtful to the brain, dangerous to the lungs, and in the black stinking fume thereof nearest resembling the horrible stygean smoke of the pit that is bottomless."

Pope Urban, the Eighth, published a bull against its use, and Russia threatened severe punishment for the first offence in using it, and death for the second. Still the consumption in Great Britain alone, in

1821, was 15,600,000 lbs.	with a	population of	21,300,000
1831, was 19,600,000 lbs.	"	"	24,500,000
1841, was 21,980,000 lbs.	"	"	27,100,000
1851, was 27,990,000 lbs.	"	"	27,460,000

In France, it is used to the extent of			19	ounces	per head.
In Denmark,	"	"	70½	"	"
In Belgium,	"	"	74	"	"

In America it is much more.

The whole human family, consisting of 1,000,000,000 of people, consume 70½ ounces per head, which requires 57,000 acres of rich land to raise.

The Emperor Napoleon Bonaparte, clears annually by the government monopoly of tobacco, $22,000,000. In New York city, there are only 210,000 smokers, who expend about $5,900,000 per annum for cigars. In England, last year, 33,100,000 pounds of tobacco were consumed, which cost about $40,100,000, $27,-000,000 of which passed to the government in the shape of duties. The world probably consumes 5,000,000,000 of pounds per annum.

In New South Wales, the consumption per head is 14½ pounds. The largest growers in the world of this renowned weed, are the United States. In 1840, the census returns informed us that the crop was estimated at 219,163,319 lbs.

In whichever way tobacco is used, the effects produced by it are the same, only differing in degree, yet no man can state distinctly what these effects are. Generally, it causes thirst, secretes saliva, and tranquilizes the mind when used in moderation; but if, on the contrary, in excess, it causes nausea, trembling, convul-

sive motions, torpor, paralysis, and death. If a man were to smoke sixteen segars at a sitting, he would never rise. Chewing is less injurious to the constitution than smoking, and snuffing less still; but it is apt to produce dyspeptic symptoms. Great smokers are sometimes afflicted with cancer in the mouth. If men were reasonable beings, they would soon banish an article so exceedingly offensive as tobacco, in all its known modes of use.

Physiologically speaking, the use of tobacco separates whole regions from each other. The States of New York and New England, taken as a whole, appear to ignore the use of tobacco, and would most willingly suppress its use even through legislative enactments, if they could. The Southern and Western States indulge in it universally, as all those who visit them find out to their cost. The Yankees object to its use because it induces thirst and leads to drinking; and the inhabitants of New York, on moral grounds, believing that it provokes alcoholic desires, temporary annihilation of thought, and the consequent evils.

The chemical ingredients of tobacco which produce such varied effects upon different constitutions, are in number three—

1st. An empyreumatic oil.

2d. A volatile oil.

3d. A volatile alkali.

The volatile oil possesses a bitter taste, and when applied to the nasal organ, produces immediate sneezing, and when taken internally, causes nausea, &c. Still, there are only two grains of this substance in a pound of tobacco leaves.

The volatile alkali is colorless, heavier than water, and is called nicotine. It possesses narcotic and poisonous qualities, little inferior to prussic acid, a single drop being sufficient to cause a dog to die immediately; and if a drop is evaporated in a large room, it will be difficult for a person to breathe in it.

The proportion of this matter in a leaf of tobacco is small, being only from three to six per cent. You may all recollect reading the trial of Count Bocarme, at Mons, in 1851, who was condemned to be executed for poisoning his brother-in-law with nicotine.

The empyreumatic oil is acrid to the taste and poisonous. One single drop applied to the tongue of a dog, will produce convul-

sions in a minute and a half, and kill many smaller animals instantly.

All these chemical matters united, produce the effects experienced by smokers. This weed is an exhausting crop, because all the matters it contains are derived immediately from the soil upon which it is grown, and they belong to a class of substances that are indispensable to vegetation, and least abundant even in the most fertile soils. Every ton grown carries off 520 lbs. of these matters, which is as much as is contained in fifteen tons of wheat. This explains why the once rich lands in Virginia have become so exhausted as to be utterly incapable of being longer profitably cultivated.

Chemistry has now taught us how to restore new fertility to these soils, and thus enable us to extract new riches from them.

OPIUM

Is a narcotic used in one of three ways—

1. Swallowed in the pill form.
2. As a fluid, such as laudanum.
3. Smoked in pipes.

The Mahomedans use it in the pill form. The Christians in the liquid form. And the Chinese smoke it.

In either form its effects are nearly the same upon the nervous system, varying according to the quantity taken, and the constitution of the individual taking it. When used in moderation, it exhilarates the mind, causes pleasurable ideas to flow, sustains strength, enables the consumer to perform fatigueing journeys, endure hardships and privations without being sensible that his feet even touch the ground. After five hours these effects vanish, and a corresponding depression follows, the muscular energy departs, a great desire for sleep ensues, the throat becomes parched, thirst insatiable, bowels torpid, muscles relaxed, pulse feeble, &c. The extent to which opium is used cannot be arrived at. In India, nearly seven millions of pounds are purchased by the East India Company from the native cultivators, to produce which requires 310,000 acres of rich highly cultivated land. The Company derive a revenue from its sale amounting in the aggregate to 20,000,000 of dollars. In some districts in India it is given to horses.

Opium contains mucilage, gum, resin, fat, volatile oil, morphine, codeine, narcotine, porphyroxine, pseudomorphine, passaverine,

and meconic acid. The most universally known among these is morphine, a full dose of which for an adult is one-seventh of a grain, still an ape can swallow five hundred and fifty grains with impunity; dogs, cats and birds can eat it without detriment.

PRACTICAL CONCLUSIONS.

Opium like liquor produces the most body destroying and sad effects upon those who use it. One hour they are filled with bliss, and the next with the torments of hades.

Those who indulge in it, become slaves to its morbid and pernicious influences, and though once bold and resolute, soon become irresolute and cowardly.

There are several varieties of lettuce that may be used as a substitute for opium, when they are coming into flower, if a knife is thrust into the stem, a white juice exudes, which is strongly narcotic, this when dried, and used, acts upon the brain, and causes sleep.

Indian hemp has been celebrated by the most remote Eastern nations for its narcotic properties, it originated in Persia. Its narcotic principle exists in a resinous substance which exudes from the leaves, young twigs, and even flowers of the plant naturally. It grows well in the North, and produces a capital fibre, but better in the tropical regions, where its fibre is worthless, while the resin is superior. The whole plant is taken up when in flower, and sold in Calcutta, in bundles, containing two dozen plants, these are smoked, and sometimes chewed. The word assassin was derived from the Arabic name of hemp.

In India it is called the exciter of desire, increaser of delight, cementer of love, and mover of laughter. The errors a person commits with regard to time and place, after having taken it, is remarkable—minutes seem to him hours, and hours days, and days years, then all idea of time is lost, the present and the past are confounded together. Three hundred and twenty millions of the human race employ this plant in some shape.

THE HOP.

The chief consumption of the female flowers and seeds of the hop, is in the preparation of beer; it has three properties which fit it peculiarly for this purpose.

1. It possesses tonic properties, aromatic flavor, and is exceedingly bitter.

2. It has alcoholic strength.

3. A narcotic quality, chemical influence, volatile oil, aromatic resin, and bitter principle.

The hop is probably the most largely used narcotic in Great Britain and the United States, but is not like tobacco used alone, except for medical purposes. It is added to malt on account of its narcotic qualities to impart taste and flavor.

THE COCA.

Our chemical knowledge of this shrub is very limited, there is a singular analogy between the leaf of this plant, the tea leaf, and hop flower. They all contain a volatile ingredient and bitter principle, and are capable of yielding tannic acid. By chewing two ounces of the coca leaf each day, and rejecting the saliva, the body becomes exceedingly strong, because it diminishes the waste of the tissues. The coca leaf like hemp possesses the quality of dilating the pupil of the eye, which opium does not possess. But it much resembles opium in imparting strength to the weary and worn body.

All opium eaters take the greatest pleasure in retirement, and generally seek silence and solitude, to enjoy profound reveries.

Many wants make the use of narcotic indulgences almost universal.

India, China and Turkey use opium. Morocco, Persia, Africa, the Indians of Brazil, and the inhabitants of the Cape of Good Hope, hemp. The Eastern Archipelago, betel nut. Bolivia and Peru, coca. New Granada, thorn apples. The Indians of Florida, holly. The Frenchman, lettuce. The English and American, hop, and all the world tobacco. There has never been a nation in existence who had not a narcotic soother, some using several.

Ten millions of men use coca; 200 millions of men use hemp; 150 millions of men use betel nut; 850 millions of men use tobacco; 350 millions of men use opium.

The probability is that there are as many of the human family engaged in the cultivation of these unnecessary indulgences as there are in the absolute necessaries of life. It is almost certain that, with the exception of cotton and the cereals, these useless crops employ more commercial capital, shipping, traffic, &c., than all the other crops put together, as the following estimates of annual value and production will show:

	Yield per acre, in lbs.	Produce in lbs.	Acres cultivated.	Value.
Tobacco	810	4,485,000,000	5,700,000	$185,000,000
Hop	670	80,500,000	121,000	20,100,000
Opium	21	20,100,000	1,100,000	40,500,000
Coca	810	30,200,000	38,000	7,500,000
Total....................	....	4,615,800,000	7,301,000	$253,100,000

Besides the above, the East consumes 600,000,000 lbs. of betel-nut.*

Besides those mentioned, there are minor narcotics, which are used by an immense number of people. The Indians in Florida use an emetic holly before opening their councils, which they imagine clears the brain. When used in immoderate quantity it produces frenzy. This plant is nearly related to the Paraguay tea-plant.

THE DEADLY NIGHTSHADE

Is a very powerful narcotic, sometimes producing drunkenness, and if used in large quantities perfect delirium of the most agreeable kind, lasting for more than twenty hours, during which time the person is speechless.

History relates that when the Danish army under Iweno, king of Norway, invaded Scotland, the Scots were commanded by them to afford drink, in which they placed the expressed juice from the berries of this plant, and while the Danish soldiers were insensible to external objects, they were put to the sword, and so many were killed that only enough were left alive to carry their king on board of the only remaining ship.

The bearded darnel possesses narcotic and intoxicating qualities, producing staggering, giddiness, &c., equal almost to delirium tremens. The vision becomes impaired, extremities cold, and partial paralysis often occurs.

The rhododendrons possess narcotic principles, and the dried leaves are used instead of snuff, producing the same effects.

The azalea is a kindred plant, and bees that use its sweets produce narcotic honey; goats, cattle, and sheep are fond of their leaves, and often die after eating them. We have the kalmia angustifolia growing on the banks of the Hudson river,

* The Betel-nut is the seed of the Areca Catechu, a species of palm, growing on the Himalaya Mountains, and almost in all parts of India, Ceylon, Malabar, the Sunda Islands, parts of Peru, Sumatra, Siam and Cochin China. It is about the size of a cherry. It fastens the teeth and cleanses the gums.

which will kill sheep in a very short time after eating the leaves of it. A sweet juice exudes from the flowers, which if swallowed by man will bring on a species of delirium tremens of a formidable nature. The odor of the vanilla absolutely intoxicates the person who gathers it. The perfumes of the violet, the rose and many other flowers act as a narcotic poison on many persons. The vapors arising from saffron have been known to produce apoplexy, and even immediate death.

The physiologist finds these profound studies highly interesting, because they are so mysterious. Our knowledge at present does not enable us to explain by what extraordinary action hemp produces catalepsy, the thorn-apple dreams, the fungus nightmares, the deadly night-shade melancholy. Chemistry will eventually explain all.

Still we know that man's wants have progressed until there now exists in the whole human family a universal desire for indulgences of a narcotic nature. In all countries this craving is modified by race and climate, Yet all men are so feeble by nature that a few drops of laudanum will prostrate them, a few puffs at a cigar will soothe them, a small portion of hemp will stimulate their mental faculties, and a minute quantity of opium will lessen their susceptibility to external impressions.

Mr. Churchill introduced the subject of the early reduction of zinc in Europe, 100 years since, as instancing several important principles, viz.: Melting with a blast in a reverberatory; separating the metal from the oxide, in cooling; producing the requisite amount of cold by evaporating water on the surface of the flue. The description given by Dr. Black suggested that the operation of fusion was conducted under pressure, but this was not certain.

The subject of discussion next week will be "Iron-cased ships."

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION, *March* 28, 1861.

Professor Mason in the chair.

Professor Mason, in opening the meeting, said: While you were discussing the effects of alcohol on the human body, at the last meeting, I was suffering rather severely under the influence of a certain amount of alcohol in the body of a hackdriver, in the streets of Poughkeepsie, who was impelled to drive his coach

into my wagon, and suddenly dash me upon the pavement; the said body being entirely unaware of having done any mischief.

This topic seems to open our way to a larger discussion of the general question of social or legal restraint on the mischievous uses of poisons. The recent disclosures by the German chemists is fixing the attention of legislators again on this topic; and we may expect a much wider discussion of this matter in scientific circles.

COMPRESSED AIR AS A MOTIVE POWER.

Mr. Wm. L. Haskins read the following paper:

On a former occasion I had the honor of introducing to this society the subject of compressed air, as a motive power for the propulsion of cars on railways.

The consideration of objections to the proposed application of the power, made here on the occasion referred to, and, if I succeed in removing them, a few suggestions as to some of the prominent advantages of the system; a system, I shall maintain, which offers the most decided improvement over all other known methods of propulsion, will form the subject of the remarks I design to offer on the present occasion.

The public mind is ever averse to innovation upon established customs in every department of mechanical science, more especially where a large investiture of capital has been devoted to their establishment. So that, in the promulgation of new theories, however specious, their advocacy has to combat a world of educational prejudice.

"The analysis of the data of experiments and calculations, fairly made thereon, with a practical knowledge of compressed air engineering, will give the best *prima facie* evidence of the economy to be effected by the use of this harmless (and beautiful) power." And here I am quoting the very words employed, partly, by Mr. Arthur Parsey, a distinguished civil engineer of England, in connection with experiments made by himself, published in the leading scientific mechanical journals of that country, and partly by the Baron Von Rathen (of London) who made similar experiments.*

In what follows, I shall have occasion to refer to and to quote still further from these high authorities because the points to which I propose to invite your attention are treated by them in a manner, with a degree of force and perspicuity, which tran-

* 1853, Practical Mechanic's Journal, 1848.

scends the compass of any language it would be within my power to employ.

But, first, the objection urged *here* against this medium as a motive power on the railway—rather, perhaps, as admitting a doubt, than to be taken in the light of a substantial, well settled argument for unqualified rejection—is, "the fear of a practical difficulty from the rapid expenditure of power in propulsion, and the great diminution of pressure in the last mile; so as to render necessary a variable cut-off, and an inconveniently large cylinder."

This objection, even if valid, in whole or in part, will vanish, and all doubt upon the subject be put at rest by considering the feasibility of providing a self-acting regulator, and placing it between the receiver and driving cylinders, through which the compressed fluid shall be made to pass, and from which in such case, not direct from the receiver, it will then be allowed to flow into the cylinders, with such an amount of pressure as may be requisite; holding back, in the main receiver, the balance of the original pressure, to be called into service as needed. So, if the working pressure required for propulsion be twenty pounds on the square inch, it will only be necessary, in the regulator, to preserve that constant pressure, in order to provide for the steady supply of the driving cylinders, leaving the stock in the receiver to be drawn out by the regulator to supply its own exhaustion and to preserve its own stock. So that the question of the validity of the proposed objection, so far as it relates to the rapid expenditure of power, need not be discussed; seeing that any difficulty, of the kind supposed, may be readily provided against by the use of the regulator.

It can be no very serious objection to the proposed system that it may require the intervention of a cut-off, any more than it is with the steam system. The advantages arising from it are far greater in the one case, in the absence of heat and vapor as a means of economizing the expenditure of power, than in the other where those influences do not exist. All the writers, experimenters and analogies concur in this view. "The principle of expansion," says Parsey, "can be carried out to perfection by compressed air." It being an expansive power, always of the natural temperature in the reservoir, as soon as it moves the piston its density must be equal to the resistance, and having no disposition to condense (not being adulterated with heat or vapor) its activity will follow the piston the whole length of the

stroke, when, on the return of the piston, it would have to meet the resistance of the contents on the other side; so that to gain every advantage it would be necessary to work it expansively, to avoid counteracting back pressure. For instance, if an engine were worked with four atmospheres on the inch by cutting off at one quarter of the stroke, on the piston reaching the end of the stroke expansion would have attenuated it to atmospheric pressure as it is blown off. At whatever density the atmospheric air may be worked the conditions are the same; for, in the greatest practicable velocities, the increased density of this pure element has an increased power of transmission equal to the increased velocity of the piston. Not being clogged with any vapor, nor liable to condense as steam does when not in contact with the water and heat of the boiler; but always being dry, and expansive and pure, every advantage of the principle of expansion may be embraced in this system.

In a reservoir of compressed air, the propulsive force of the whole body follows the current through all the passages to the induction ports of the cylinders, leaving the quantity, when cut off, that has moved the piston *all* its expansive force to carry it to the end of the stroke. Should the density of the current be greater than the power required to overcome the resistance of the piston, the overplus power will give it a speed equal to the density, an attenuation will take place that will equalize the moving force and resistance; which, being sufficient to keep the machine in motion, the extra density will not be lost power, but only serve to increase the speed; which extra pressure in the use of steam is blown off at the safety valve. Thus it is the time, and not the speed, that determines the quantity of power requisite for a given load for a given distance; for if a certain pressure on the piston moves the engine over a mile in two minutes, in which time the piston has travelled 150 times; by applying a duplex density, which increases the speed of the piston to 150 in one minute, the speed of the engine will be increased, the time halved, but the distance and the power used will be the same, or very nearly so, as it is only applying the requisite power quicker; because the piston cannot wait to equalize the moving density with the higher density of the current supply.

With a reservoir of prepared power, the working can be relied on, not being subject to the fluctuations of combustion, artificial temperatures, and the difficulties of steam.

From these considerations, it may readily be seen that the cylinders and piston need not be so large as in the steam system; for as steam attenuates in the passage from the boiler, and under the moving piston, and although it has not time in a locomotive to lose much heat and condense, it has but a limited expansion when discharged from the boiler—certainly very inferior to the expansion of compressed air, which will always be augmented by the increased temperature of the cylinder from the friction of the piston above the natural temperature of the reservoir. Smaller cylinders will therefore be necessary to economize power; and as the pressures on the piston can be increased or decreased to the maximum or minimum resistance occasionally demanded on inclines, or the various loads to be drawn, the expenditure of power and the duty of a line may thus be readily equalized.

I have thus dwelt at some length upon the single objection advanced here; because, if that objection be of any weight, we need not proceed another step; it would be fatal to any attempt to introduce compressed air as a motive power on railways. And I have shown, by reference to the authority of enlightened engineers, that, as to the cylinder, smaller cylinders than for steam are demanded for the economical use of the power; and that the power itself is eminently adapted to its being worked expansively. And I have given the reasons—if not all that might be adduced, as many as time will allow me even to refer to—on which these conclusions are founded.

There is therefore no practical difficulty to be overcome, growing out of the rapid expenditure of the power of compressed air, which requires a larger cylinder than for steam; and none whatever on the score of expansion, because the power, as we have seen, is peculiarly adapted to that method of working, and therefore every advantage of the principle of expansion may be embraced in it.

But a suggestion was also made here at the same time, to the effect that, with a full charged receiver, if compressed in whatever density of the capacity of 65 cubic feet, which I had stated to be the contents of that proposed, an ordinary car could not be propelled a single mile by reason of this supposed rapid expenditure of the medium. It will be a sufficient answer to that suggestion to advert at once to the result of practical experiments made by both of the distinguished individuals already mentioned.

The Baron Von Rathen is spoken of by the London Scientific Journals as "a veteran supporter of the doctrine of the utility of compressed air as a source of power." He is not only the inventor of an air carriage, and his improvements refer to the compression of air and the expansion and regulation of it when used as a propelling power; but, also, of a new description of hydraulic pump for compressing and cooling air. The "London Artizan," after a full examination of his invention and specifications, remarks, "that precautions have been taken therein for the avoidance of the loss of power in compressing and expanding air, which has hitherto excluded compressed air from being usefully employed as a propelling power—a power," it adds, "offering such great advantages as regards safety and comfort."

The London Mining Journal is referred to by the Scientific American, (Scientific American, vol. iv. No. 11, Dec. 2, 1848, p. 82,) as authority for saying that a third trial had been made for testing the capabilities of the Baron's compressed air locomotive on the common highway, for working the air expansively, and which operated well, although one or two leaks subtracted somewhat from the real power. As it was, however, the carriage weighing three tons and carrying from 25 to 30 passengers, started in good style and kept pace with former experiments as to time and distance; the motion was regular, and the machinery stood well, the only casualty being the leakings. That the patentee considers he has now completely solved the problem of the practicability of employing compressed air in locomotion, and regulating it as to distance, speed, load, nature of road, &c., on which, in the greater or less perfection in the construction of the machinery, its success, of course, depends. That he is prepared to show, to mathematical demonstration, that he can embody sufficient power in his model air carriage to convey 4½ tons, including carriage, ten miles in one hour on common roads, or a train of 45 tons in the same time, the same distance, on a railroad; and that if carried out on a large scale on the latter, he contends that the system would effect a saving of 75 per cent. over the steam locomotive.

It is to be regretted that the mere result only of this experiment is given, without many of the important details as to dimensions of carriage, receiver, engine and cylinder. I have not been able to obtain the Journal referred to by the Scientific American. But, with a carriage designed to traverse common highways, and

to seat 25 or 30 passengers, weighing but three tons, it will not be difficult to imagine how little of its area might have been devoted to the purpose of holding a receiver; now as to size of other parts of the machine, and barren as the account is in details, it is still sufficient to prove that "no inconveniently large receiver or cylinders" were required or employed to accomplish the results attained; and enough is gleaned from the "Artisan," in treating of Von Rathen's patent, to show not only that he used the air expansively, but, also, that he applied it to the working cylinders through the medium of a regulating valve or separate regulating cylinders; for that paper speaks of "a method," without particularly describing it, by which the Baron effected "the regulation of the degree of working pressure by an ingenions contrivance, so as to be uniform, by the operation of a self-regulator, susceptible of being increased or diminished if required."

I will now turn to the particular views and experiments of Mr. Parsey, as set forth by himself in an article contained in the London Mechanics' Journal.* He says:—

"Though the possibility is popularly entertained, like the quadrature of the circle and perpetual motion in science, the practicability of compressed air power has been given up by the generality of engineers as unattainable. Steam having gained the ascendancy and command over the working of railroads, a change from a system so well understood for a repudiated practice scarcely comprehended, is not desired by the established and flourishing steam interests, which, as in all former instances, are opposed to the adoption and progress of improvements supposed to affect them.

"The known power of compressed air has not hitherto been brought into use on account of the difficulty of controlling it at high densities, and of working it with a continuity, as well as a uniformity of pressure on the piston."

"That fatality," as he calls it, he deems "to be now perfectly overcome" by means of his patent engine.

His experimental engine weighed 1½ tons; capacity of receiver 39 cubic feet; pistons 2½ inches diameter; 9 inches stroke; driving wheels 4 feet.

"This engine was filled at the Stratford workshop by a small pump of 2½ inch plunger, 6 inch stroke, to a pressure of 165 lbs. per square inch, when it was placed for the first time on a rail."

* Practical Mechanics' Journal, London, 1852-3, p. 288.

He designed, it appears a much greater pressure, but his experiment having to take place between the running of frequent trains, and an injunction was laid upon him, by the proprietors of the track not to exceed 200 lbs.

"A pedal brake wheel was fixed on the centre of the driving wheel axle, and the brake block adjusted to clear it. The engine carried himself and son, the superintendent of the ways and works, locomotive engineer, and four others, making eight persons. She started under the pressure *on the brake* (unobserved in the hurry till her return) and ran from Stratford to Seabridge and back, a distance of four miles in half an hour. The brake wheel, a rough casting, was polished with the friction. The working pressure was set by the regulator at 20 lbs. on the square inch on the pistons, only 2½ inches in diameter. This pressure propelled the engine and its passengers (two tons), with the impediment of the brake on, the distance of four miles, at the rate of eight miles per hour. Thus 39 cubic feet, at a density of 11 atmospheres, or about 400 feet of atmospheric air, effected a performance which gave entire satisfaction to all who witnessed it. As the chief locomotive superintendent, who was absent during the first experiment, complained that the workmen neglected their business on account of the interest excited, he was allowed the favor of a second experiment, and the experimental engine was taken out of the way down to Cambridge, where it was filled by the same pumps to the same pressure as before, under the supervision of the superintendent of the locomotive department and the principal foreman of the establishment. Several of the proprietors of the eastern counties went down to Cambridge to witness the performance. The engine started opposite the 60th mile post on the Water Beach Junction. The working pressure was set by the regulator at 15 lbs. only on the square inch, and she ran one mile in five minutes—rate, 12 miles per hour; then at 20 lbs., and she ran the second mile in four minutes—rate 15 miles per hour; the regulator was then reduced 1.15 lbs. and she completed a journey of 5½ miles in 19 minutes."

"A steam locomotive loaded with engineers, &c., followed and witnessed this decidedly successful experiment. This small engine," says Mr. Parsey, "would have run twenty miles, if charged to the density I had proposed."

Mr. Parsey then proceeded to describe the leading features of his invention, consisting chiefly in the regulator used, and by

which the gratifying performance of his engine was thus successfully accomplished, embodying the description in remarks, which may tend, in his own words, "to a better understanding of the improvements in locomotion," and to which, from their remarkable pertinency, I beg leave to invite your attention.

"The practicability of the use of compressed air, solely depends on the means of controlling it at high densities, and of regulating and producing a uniform and continuous working pressure.

"A compressed air locomotive is charged with an amount of power previously prepared for a given distance and not generated as in a steamer while running; consequently, so great an amount of power being packed up in so small a compass as an ordinary railway carriage, designed for the proper accommodation of the usual number of passengers would afford, the pressure in the receiver, which must be much greater than high pressure steam, will require skillful control; and as this packed up power has to be expended according to the friction or resistance of the engine, and the load it has to draw, it will be manifest that a certain and perfect means of fixing, maintaining and adjusting the working pressure on the piston, is of the most material consequence in the working of them.

"In a steamer it is necessary that the evaporating power of the engine should be able to generate sufficient steam, at a pressure in the boiler fully equal to the resistance of the engine and its load on the pistons; and it is the part of a skillful driver so to urge his fire as to continue this condition, according to the duty required of his engine.

"But, in compressed air engines, this skill and vigilant attention to the generation of the power will not be required, as compressed air will be prepared for him at certain stations, where he will replenish his engine with air, as he does now with water, to carry him on to another replenishing station. Taking up from stationary reservoirs, in two or three minutes the amount of power that will carry him over, say 20 or 30 miles, his business will be simply to apply to the piston, by means of the regulator, a pressure that shall overcome the resistance, and to regulate the supply to the driving cylinders, so as to effect the requisite speed.

"All the steam generated in the boilers does not pass through the cylinders, as all the pressure indicated in the boiler above the pressure that overcomes the resistance of the pistons is lost

power, amounting to a considerable portion of the power generated. But that will not be the case with compressed air, as there are no valves to suffer the escape of the pressure above the resistance of the pistons, and no loss of power can take place, as it must pass through the cylinders and have done work before it can escape at the blow-off passage. The material point, therefore, will be to ascertain the resistance of the engine and load, and to set the self-acting regulator accordingly.

"This important but simple operation is effected by a separate cylinder, with its regulating apparatus placed between the receiver, charged to a very high density, and the driving cylinders. This part of the machine restrains the violent force of the stock of power in the receiver, and at the same time gives a constant pressure on the pistons. Being self-acting after it is set to any given pressure, the engine will work steadily and maintain a uniformity of speed, upon a level, till the density in the receiver has been gradually reduced to the working pressure; before which time, if driven properly, the engine will have reached its proposed distance, when it can be replenished for the next distance of its journey."

The apparatus here spoken of, to be placed "under the front plate in large engines," will occupy but little space, as may be seen by illustrative drawings appended to the communication. Though other, and a variety of modes, perhaps equally good for regulating the supply to the cylinders and the pressure on the pistons, may be adopted with equal advantage.

"As compressed air loses no power from keeping, engines may stand charged and be started at a minute's notice, neither wasting power, costing anything, nor doing any damage to the engine, which cannot be the case with steam locomotives."

The advantages of compressed air power are thus summed up by Mr. Parsey, under the idea of substituting it for steam in moving trains:

"1st. A reduction in the prime cost of locomotives of twenty per cent. or more, arising from air reservoirs, &c., costing less than boilers, tubes, fire boxes, &c., for which they are substituted.

"2d. A reduction of one-third the present number, as air engines will run any length of journey (which steam locomotives will not) without being changed; and not requiring to be inactive in the workshops, so many spare engines will not be wanted as for steam.

"3d. A reduction of three-fourths of the present expense for repairs, as air engines will not be exposed to the destructive effects of intense heat and steam.

"4th. A vast saving from increased durability in the ratio of fifty to one; as air reservoirs will last one hundred years or more, and the fair wear and tear will only be on the frames, wheels, springs, &c.

"5th. A saving of one-third on fuel, by using coal at compressing stations, instead of coke in locomotives.

"6th. A total saving of water, as air engines carry none.

"7th. At present, cleaning and washing out of steam locomotives is a heavy expense, which may be reduced three-fourths, as air engines will only want outside cleaning, which can principally be performed by the driver and his mate.

"8th. As the nature and extent of repairs will be very different, and so much less than steamers, workshop expenses may be reduced on a ratio with the economy of the above items, so that it must be evident the savings on prime cost, repairs and working expenses of the steam locomotive account may be reduced one-half."

To which may be added, 9th and last, what Mr. Parsey seems to have overlooked, an immense saving in construction account, growing out of the excessive weight of steam locomotives with their tenders and material, together varying from twenty to forty tons. To provide a bearing surface capable of enduring and withstanding the crushing, grinding and splintering force, against the constant hammer and abrasion of such a superincumbent weight rolling over it, must, of necessity, very greatly increase the cost of constructing roads.

In the absence of all necessity for attention to the fires in generating steam power, under all the fluctuations of wind and weather, the working of an engine with compressed air is wonderfully simplified; and, as the temperatures of excessive heat, with all the difficulties of ascertaining and calculating them and their effects, are removed, and nothing but natural temperatures having to be dealt with, the advantages of compressed air power need not to be dwelt upon.

"The strength of air reservoirs, making them securely air-tight at high densities, and the pressures they are capable of sustaining for the want of practical experience, are very little understood; one hundred pounds per square inch is thought consider-

able with high pressure steam, and as explosions occur, and boiler and tubes burst, with pressures not much exceeding one hundred pounds, a pressure of five hundred to one thousand pounds per square inch of compressed air in a cylinder or reservoir, can scarcely be entertained as safe. The tests and experiments made with steam as to the strength of materials, and the calculations of the most eminent men made upon them, are totally inadequate to give a satisfactory theory of the sustaining strength of vessels with pressures free from the heat and vapor of steam."

"Cylindrical boilers would sustain the same pressure with steam, were it not that heat separates every particle, while expansion weakens the metal; besides, explosive gases (the force of which cannot be ascertained) creates a pressure that bursts them, which simple pressure cannot do. Hence the strength of cylinders for holding compressed air at high densities, is abundant and safe."

If such important results as those related both by Von Rathen and Parsey have been worked out, why, it may be asked, have not the plans of either of them been adopted and reduced to practice? A complete answer to this pertinent question is, that the practical utility of the motive power they demonstrated, was still limited by the serious want of providing along the route on the track for a continuous supply of the power demanded by exhaustion, without requiring compressing power at every point wherever replenishment may be needed, and without the necessity of coming to a full stop with their motors, in order to receive it. No such plan of operation had entered into the calculations of either of these two inventors. To run an engine, for the purpose of moving a train, with such a stock of compressed air as could be packed up in a receiver borne along by and with the engine, as far as that stock would propel it, and then stop as post-horses do, at a relay tavern, where to replenish the means both of compression and delivery are to be provided, and where reservoirs are to be kept supplied, could not be deemed such a practical advantage in comparison with steam, as would be worth exchanging steam for; and therefore, their experiments and exploits, so far as practical usefulness is concerned, remain in abeyance, a dead letter, to this day.

It was reserved to a later period in the age of discovery, to devise the method which should place the compressed air on the track, in a reservoir extended along the line of the route, acces-

sible to the engine and its receiver, whenever and wherever required; fixing the compressing stations at distances apart of twenty miles or more, and those for delivery to the engine at such convenient distances as may become necessary, depending on size of receiver, duty of the line, grade to be traversed, and other conditions which experience will not be slow to indicate; communicating reservoir to be tapped at those points where delivery is required, and there a communication to be established between reservoir and receiver, in such manner that the re-supply required to propel the engine with its load to the next point of its journey, shall be furnished in a few seconds of time without necessarily stopping for that purpose. That method, in our own country, has been both devised and patented.

But, as the proposition is, for the present, to apply the compressed air power to city routes, and as these routes will be found not to exceed the distance, which a carriage, provided with the power, may run without replenishing, with the supply of compressed air originally furnished to it at the starting point; there is no immediate occasion to more particularly describe the arrangement by which the replenishing process is to be carried out. For, if an air carriage may be propelled by the power packed up, at the starting point, in its own receiver, a distance, according to the suggestion of Mr. Parsey, of twenty or thirty miles; or even according to our own theory, which is fully borne out by Mr. Parsey's experiments, eight miles; there would be no necessity for replenishing the power, for Broadway in our own city for instance, till the return to the starting point. Even if that distance should not exceed four miles that assumed by Mr. Stetson, and expressed with emphatic confidence, in reply to a question propounded by your chairman on the first occasion of introducing the discussion, *one* replenishing station *only*, would be requisite, and for that a space of ten feet square might be had at the battery, which could not be devoted to a better purpose.

The English engineers evidently thought of nothing short of long routes when bringing their experiments before the public. For, the idea had scarcely begun to be entertained, at that time, in England, of putting railways for city travel in their streets, as we have done for years past. It is only within a recent period that horse cars have been run in any of their larger towns, after the fashion in vogue here. There being, then, no short or city routes in use there, or in contemplation, at the time of those

experiments, on which they might have been tested, accounts for the cold shoulder being given to the results they disclosed; when the mode of replenishing the exhausted power was to be effected with a delay and expense and under drawbacks and conditions, which, on the face of it, would seem to counterbalance whatever advantages it might otherwise be supposed to possess.

The distance to which cars, designed to convey the same number of passengers as those in common use, on our city routes, may be run, by compressed air packed up before starting, in their receivers, which shall be so arranged and placed as not to interfere with the proper accommodation of that number of persons, but to be out of their view, is the point to be considered, and the only point to be settled in estimating the practical advantages or disadvantages of the proposed system. All else, in reference to it, seems to be established by the demonstrations already given.

I have, thus far, in presenting this subject, limited myself to data derived from experiments and deductions of distinguished, practical civil engineers in England, whose convictions and statements are the result of close investigation and the fruit of their own experience in actual practice.

And here I might stop, but that in so doing I should do injustice towards other parties—injustice to my own subject and violence to my own feelings, were I to omit a reference to a report drawn up, after a "careful examination" on the system we are considering, by Mr. Thomas Stetson; which report was fully endorsed by Mr. Henry Waterman;—and, especially, if I should fail to advert to the remarkable agreement, and coincidence of views, there is to be found in that report, in very many important particulars, with the results obtained and opinions expressed by those eminent English engineers; the fruit of whose investigations could scarcely have been known to us on this side of the water, at the time that report was submitted. The length of the report and great variety of its details and calculations forbid a more particular reference to it, than a few extracts will afford:

Mr. Stetson says: "There are no mechanical impossibilities involved in the system. In this respect, the question of its practicability may be answered without hesitation. It is practicable to transport passengers and freight at speeds as high as those attained by the present steam-propelled trains; to do it by cars traveling singly, so as better to accommodate the public, and to

travel over much steeper grades than any now found, even on railroads worked by horses. There appears to be in the theory of re-charging while in motion no difficulty which cannot be overcome by a proper arrangement of the details, and, in addition, if necessary, by reducing the speed on approaching a supplying station, and increasing it again after passing. In regard to the commercial advantages or disadvantages of the system as compared with those now in use, there are many points which can only be determined by experience; but the following may, however, be considered as definitely established:

"1. That making due allowance for the great economy of engines employed in pumping, over all varieties of engines for ordinary purposes, the cost for power at the pumping stations will be only about one-quarter as much as that now developed in steam locomotives, reckoned horse for horse.

"2. That coal may be used for fuel at the best advantage—a point which, though much striven for, has not yet been attained in locomotives (April, 1858).

"3. That tight, safe, and in every respect efficient receivers can be constructed sufficiently light to be placed in the cars, and in this respect to allow this system to be worked with advantages over either the steam locomotive or the horse systems, on a very great majority of lines.

"4. That the track will endure longer in transacting a given amount of business by this system, than under the crushing weights of locomotive steam engines. And

"5. That grades steeper than are ever worked with steam locomotives could be allowed on a road worked by this system.

"Your system allows of working by long trains of cars, coupled together in the ordinary manner; but is peculiarly adapted to the running of cars, singly, or in very small trains, and at short intervals, for the better accommodation of the traveling public. The air might be worked expansively with advantage by the ordinary link motion, and the engine be made capable of reversing. But simplicity is a matter of great importance, and I have constructed tables presented herewith, in such manner as to show the results due to the working by the simplest possible mechanism without expansion. The points presented in these tables are capable of being exactly ascertained by mathematics alone. But the effect can be very materially increased by working it expansively. By cutting off at one-fourth of the

stroke, the distance the car would travel between charging stations may be increased 100 per cent. under ordinary circumstances."

The tables referred to, of which there are three, are designed to show—

First, *the total force*, in pounds, required to impel at different given velocities, on given grades, a single car, estimated with its load at seven tons, with a receiver of 65 cubic feet capacity, and with two cylinders, each five inches diameter and fourteen inches stroke, worked non-expansively.

Second, *average pressure*, in pounds per square inch, required in cylinder to impel the car at similar velocities, on similar grades; and

Third, *distance* which may be traveled without re-changing at 20 miles per hour on similar grades at given pressures on the pistons.

I thank you, Mr. Chairman and gentlemen, for the earnest attention you have given to this subject, and trust that, in accordance with your design of standing between the imaginative and over-zealous projector or advocate of new theories and the great public, in which the latter is sometimes in danger of suffering at the hands of the former, you will favor me with some expression of your judgment upon the merits of the proposition thus submitted to your consideration and decision.

The President believed that the most effective mode of propulsion would have to be adopted in this city, and whatever that mode might be, the least desirable would be found to be horse-power, which would be abandoned. He suggested that the report be referred to a committee, and a motion was made and adopted accordingly. The gentlemen appointed on the committee were Messrs. John Johnson and J. K. Fisher.

NOVELTY CHURN.

J. E. Walter exhibited a churn patented in 1859. Sweet milk is churned at a temperature of 62 deg. inside of five minutes, leaving the milk as sweet after churning as before. The milk is taken just after the animal heat has left it, and put into the churn. The churn has a double bottom; milk is put into the upper chamber and water in the lower one. In cold weather warm water is put in. A thermometer fixed in the end of the box indicates the temperature which should be 62 deg.; when

the milk has reached that exact temperature the warm water is drawn off and the churning commences. The churning is done by two shafts, with 24 corrugated dashers each, making 10 revolutions to one revolution of the crank outside. Cream can be churned as well as sweet milk; but sweet milk, after being churned, will retain its sweetness from three to five hours.

Mr. Dibben inquired if this was any different from other plans for violent agitation.

Mr. Walter said that it was; in this the temperature was kept at 62 deg., which was found to produce the best butter.

HERMISED INDIA-RUBBER.

Mr. Seely said that he had recently visited an india-rubber factory at Beverly, Mass., where he learned some very curious facts in relation to that manufacture. India-rubber had been known about a hundred years, and only within the last twenty years had it been found of much practical use. Very few people knew why it was that india-rubber possessed the property of rubbing out pencil marks, It was generally supposed that it was done simply by friction, but a better explanation was that the rubber, becoming electrified by rubbing, attracted the powder of the pencil. As to the discovery of vulcanization, to which was due the present extensive use of that article, and without which it was almost good for nothing, Charles Goodyear had the reputation of it in this country, and Charles Hancock in Europe; and though Mr. Goodyear was scarcely known in Europe in connection with the discovery, yet Mr. Hancock admitted that he was led to the discovery of his method of vulcanizing by a piece of india-rubber that he had received from America that had been subjected to such a process. In the town of Beverly, Mass., for some years past, there was a manufacturing company that used a devulcanizing process, taking old rubber, and making it up chiefly into india-rubber cloth, under a patent with which Goodyear's did not interfere. And for the last four years they had been working the raw rubber by a process of vulcanization without the use of heat, as required in Goodyear's patent. The rubber is put into a solution of chloride of sulphur and sulphuret of carbon, and the change is effected in its properties in a few minutes. This process was called hermising, to distinguish it from vulcanizing. The patent was Mr. Parmalee's. The hermised rubber possesses substantially the same properties as the vulcanized. It has the advantage, however, of being made of a

lighter color, and therefore of receiving quite brilliant tints. The lighter color arises from the fact of rubber being less exposed to the atmosphere during the process, which exposure, in Goodyear's process, turns the product almost black; and to make it lighter, zinc white, or some other kind of white material, is required to be added. Mr. S. exhibited some very beautiful specimens of colored rubber made by this new process, and, among others, a globe containing a map of the world, which, the President said, Goodyear, after much experimenting, was unable to produce. Mr. S. also exhibited some milk of the rubber tree, ammonia being added to it to preserve it in a liquid state. The milk in the bottle was perfectly white.

The President stated the fact that india-rubber car-springs were passing out of use. It was found that the jolting of the car caused the india-rubber at last to lose its elasticity.

Mr. Churchill exhibited some pieces of vulcanized rubber which had been subjected by him to mechanical tension, and the action of steam for the space of about three hours. The result was that the rubber was perfectly brittle.

SELF-ADJUSTING SUBMISSIVE SPRING.

J. M. Forrest, of Virginia, exhibited and explained a carriage spring with the above title, which he had patented. It consists of several leaves of steel, like the elliptic-spring, but the form is entirely different. The advantages claimed over the elliptic spring are these:—First, there is only one hole drilled through the leaves, which is necessary to fasten it, with the addition of two clasps, to the axletree. Second, there is no welding, and therefore it is less troublesome to the manufacturer. Third, the spring divides the weight equally on the axletree, thereby rendering the axletree less liable to break. Fourth, it is self-adjusting, springing its entire length with a light weight. Fifth, it is rendered submissive by a cross bar attached by hinges to the end of each spring. Sixth, it weighs much less than the elliptic spring, and therefore costs less. Mr. Forrest stated that he had in a carriage with a spring weighing only fourteen pounds, driven the horse, and written a letter at the same time. He regretted to say that he had come north in order to get the springs made, and he did not succeed in finding a man who could make what he wanted till he got to New Haven, where he found a very ingenious Dutchman that did it.

STEEL-PLATED SHIPS.

Mr. Stetson adverted to the report that the Emperor Napoleon had countermanded the order for the construction of steel-plated ships, and said that that report needed confirmation before it should be credited. Sir Howard Douglas had taken the ground that iron-plated ships would not be able to withstand the immense force of modern projectiles. Other authorities were almost unanimous in the opinion that they were destined to create a revolution in naval warfare. France and England were now changing wooden for iron vessels. When ship was matched against ship, there would be no question as to the superiority of iron-plated vessels. With regard to land batteries, however,—earthwork, timber or masonry against plated ships—it became a different question. Timber ships were not expected to resist cannon balls. What would be the result with iron-plated vessels? If a ten, fifteen or twenty-inch cannon ball would make a hole sufficient to drive a horse and cart through, in consequence of the crushing in of the iron, then it would become a grave question whether iron plates were practicable. Mr. Stetson referred to an attack on a fortress in the Crimea by three French iron-plated vessels, where the fortress mounted more and heavier guns and more men, yet the attack was successful.

The President inquired if the result of the modern improvements in warfare would not be that fortresses would be found to be more than a match for ships, causing them to stay at home.

Capt. Bartlett, late of the United States Navy, thought that question could be answered by the fact that the introduction of the Colt pistol had not made men any more peaceable, but the reverse. As to iron-plated vessels, he considered them vulnerable at the two ends, where they were not plated. General James, of Rhode Island, had succeeded in making a cast-iron shot, of the Minie rifle ball character, and had, as he thought, perfected it. The iron shot was made explosive—that is, so as to explode when it strikes the object at which it is fired. The practical effect of this invention was to render a 24-pounder Columbiad equal to a 48-pounder, without adding one ounce to the gun, and it would last longer and fire further than if used for round shot. The rifling of the gun could be done without taking it to the foundry. The shot was cast hollow, and was provided with a plunger and percussion cap. He had seen a shot fired at a sandbank, and it exploded at the instant of contact. And yet one of

these balls could fall 30 feet and not explode; so that they could be handled and used with safety. These shots could be fired on the water, instead of at the side of the ship, just under its steel-clad sides, and the vessel thus destroyed. As regards the effect of heavy ordnance, he had seen a 12-inch shot fired from the "Peace-Maker," now at the Brooklyn Navy Yard, a distance of 658 yards, on a dead level, and it went clear through a ship, making a hole on the other side big enough to drive a horse and cart through.

Adjourned to Wednesday evening, April 3d.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
April 3, 1861.

John P. Veeder in the chair.

WATER WHEEL.

I. D. Seely, of Western New York, exhibited a model of a water wheel recently invented and patented by himself, which he termed a "cylinder wheel," combining radial buckets and scroll discharge. In inventing this wheel, he attempted to overcome four difficulties, one or more of which he had found to exist in every other wheel that he had known, and the result was that he had secured in this wheel the following advantages:—

1. Ability to run under water or with back water.
2. Great reduction in the cost, as compared with the turbine wheel.
3. Adaptability to small operations, such as churning.
4. Saving the centrifugal force of the water.

The wheel is intended to be made of cast iron. The inventor had only tested practically one made of wood, 18 inches in diameter. He had used a turbine wheel that claimed to use 78 per cent. of the water, which carried a 2 foot cross-cut circular saw under 15 feet of water. By substituting his own wheel, he has added a 14-inch slitting saw, and could run them both.

EXPLOSIVE KEROSENE OIL.

C. A. Seely referred to an account of a recent explosion of a kerosene lamp. An explation of the cause had been suggested, namely, the addition of cheap alcohol. This might be so in this particular instance, but alcohol is no cheaper than kerosene. The more probable cause was this: from petroleum a varety of oils are distilled, differing in volatility; some volatilizing at 600°, and others at zero. He had at his laboratory oil which would

boil at 100°; and out of that another could be separated which would boil at 60°. The old genuine coal oil was safe enough, but the mixtures now added made the oils volatile at a low temperature, like burning fluid. These mixtures were added because the manufacturers had at present no other use for them. There would be more explosions unless this adulteration was stopped.

Mr. Dibben believed that this explosive kerosene was mixed with alcohol. He had seen kerosene, so called, that was burned in a lamp without a chimney.

Mr. Stetson suggested a test of the explosive quality of oil. If it would burn in an open dish or on clothing, it was dangerous.

The Chairman stated that, within 12 or 18 months, petroleum had entered very largely into the supply of kerosene.

Mr. Wadsworth said that oil standing at 40° or 41° by Baume's spirit test was not explosive. The mixture of petroleum made a whiter and more handsome oil, but it was dangerous. Petroleum sometimes ranged as high as 47°, and was therefore explosive. If the oil could be lighted with a match, like alcohol, it was explosive.

The Chairman said that camphene was not of itself explosive, only when mixed with alcohol.

Mr. Seely.—Explosion is produced by rapid burning. If you could burn a stick of wood in an instant, it would make a report like a 64-pounder. The reason why burning fluid explodes is, it volatilizes and mixes with air. Heat sperm oil sufficiently, and it will explode.

STEEL PLATED SHIPS.

Mr. Dibben.—We have heard full descriptions of the wonderful structures *La Gloire* and *Warrior*, lately built by the French and English. But I desire to call your attention to the fact that these are but imitations of the ship or battery of the late Robert L. Stevens; and although our press has ridiculed the latter by naming it *Stevens' Folly*, *The Nondescript*, &c., yet, from a limited knowledge of this nondescript, I believe that it would be more than a match for either of the former. As early as 1838, Mr. Stevens submitted to the United States government plans for a ship similar to the present structure, to be used for the defence of New York harbor, to be shot proof against the heaviest naval guns then in use (64-lb. shot); but shortly after this the United States navy adopted 10-inch guns, capable of throwing round

shot of 120 lbs. Again, Mr. Stevens, after a long series of experiments, proposed to meet this increased efficiency of the gun by an increased resistance, and in 1854, the keel of the present ship was laid, which is about 400 feet long and 45 feet beam, with a displacement of about 6,000 tuns at 20 feet immersion, to be propelled by two screws of 20 feet diameter and 25 feet pitch, driven by eight engines, 45-inch bore and 3 feet 6 inches stroke, designed to make 100 revolutions per minute. With boilers capable of keeping steam at from 50 lbs. to 60 lbs., this would give an effect of from 8,000 to 10,000 horse-power. This, with a model of great beauty, will give her a speed that would enable her to run down any ship that floats at this day. The battery, which, in fact, is the only part that is above the water, occupies only a section of about 60 or 70 feet in length amidships, and rises about 20 feet above the water line, containing a working deck, beside an upper deck designed to be bomb-proof. The sides are protected by combined plates of iron 8 inches thick, with the space between them and the ship's sides (about two feet) to be filled in by alternate layers of wood and rubber. I would note here that Mr. Stevens found the best wrought iron plates 7 inches solid thickness could be shivered and broken by a 120-lb shot at short range. The fracture of one of these plates that I remember seeing, presented the appearance of cast iron, rather than fine wrought iron. This ship carries no mast, and is not designed for cruising or foreign service; nor do I believe any of her transatlantic imitations are fit for such service, for the reason that, when furnished with armament and stores, they would have but limited capacity for coal. The ship I have attempted to describe has so far progressed that she may be completed and made ready for service in from three to four months.

Mr. Bartlett said that the credit of introducing and provig the practicability of iron clad ships was fully awarded to Mr. Stevens by the London Quarterly Review. The English experiments seemed to show that almost any number of thin plates riveted together could be pierced, but that a solid plate 4½ inches thick was almost shot proof. He thought that the eight inch plates experimented upon by Gen. Totten were proof against any missile ever yet discharged, when the plates were backed by solid masonry.

Mr. Stetson believed that the idea of iron plated ships originated in America. Mr. Stevens tried thick iron, and afterward

chose a series of thin iron plates. Gen. Totten used thick iron for earthwork; the English had applied the same thick iron to ships. But Whitworth's projectile had punctured the thick iron plates in England, and it was a question whether a single plate could be made tough enough. A thick mass of iron could not be forged so as to produce the same effect on the interior as near the surface with the present forge hammers. There was no way of rendering the interior as strong as the surface.

Capt. Bartlett believed that a vessel could be built to float in the bay of New York that no shot would penetrate, but yet it would not be invulnerable. It was well known that granite reefs were removed several feet under water by the weight of water only and a sufficient quantity of powder. A single shell would be sufficient to destroy a bomb-proof vessel if it could be exploded under the ship. When Mr. Stevens first appeared at Washington with his plans for an iron-clad vessel, Commodore Stockton declared that he would be able to bore it with his improved cannon. It had been settled that an iron plate, eight inches thick, would resist any shot at present used. Fortifications could be built strong enough to break any shot for a given time; but any fortification could be taken at last by shot and shell from a land battery. It was merely a work of time. So iron plates, being battered for a length of time, would become brittle and give way. Iron-clad ships were not practicable for cruising—only for harbor defence. Capt. B. exhibited some of Gen. James' projectiles, of which he spoke last week. The shot was covered with canvas, underneath which was a tin casing, and underneath the tin casing was a quantity of lead. The lead was run into the hollow part of the shot, and through several longitudinal openings to the tin casing on the outside. The first effect of the explosion is to expand the lead, and thus destroy the windage, the same as the Minie ball. As soon as the shot comes out of the cannon, the tin casting is thrown off. The shot goes out on a half-turn from the rifling of the gun; then as soon as the tin and lead are stripped off there are rifling grooves in the shot that come into play. The largest of the shot exhibited weighed 81½ lbs.; it was carried by an ordinary 42-pounder with a charge of 10½ lbs. of powder, at 5 degrees elevation, a distance of 2,221 yards, and went through 52 inches of solid oak. A small plunger inside contains a percussion cap, which causes an explosion the instant the shot strikes an object; even a sand-bank will cause an explosion before the shot enters three inches. The shot then splits longitudinally.

The President (Prof. Mason) inquired whether percussion shell had been used in the navy before Gen. James' invention.

Capt. Bartlett.—I think not.

Mr. Stetson believed there was a better projectile than this of Gen. James', to which too great prominence had been given by the United States Government. The explosion of the shell in striking iron-cased vessels would diminish the effect. The shot should be kept solid.

Mr. Babcock said there was no doubt of the originality of this style of projectile of Gen. James', but he was not the first to make explosive shot. That was done 20 years ago by Norton.

Capt. Bartlett mentioned some experiments in that direction, on a small scale, 21 years ago, in which he was concerned. In his judgment there was most unquestioned novelty in Gen. James' invention; the windage was never got rid of before.

Mr. Babcock claimed that the Hotchkiss shot possessed all the advantages of Gen. James'. He stated that he saw, and measured the target through which this 81-pound shot had penetrated; it was three thicknesses of timber of one foot each, making 36 instead of 52 inches. The shot might have struck the braces behind, which would make up the additional thickness. With the exception of this one shot-hole, none of the shot penetrated more than 18 inches.

On motion, the meeting adjourned till Thursday evening, April 11, at 7½ o'clock.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION,
April 11, 1861.

Mr. Jireh Bull in the chair.

Mr. G. B. Turrell exhibited a model of Baudelot's beer cooler. The wort is caused to descend from one to another of a series of horizontal water pipes connected at the ends, through which a supply of cold water continually ascends, being gradually heated as it rises, so that the boiling wort first encounters a water pipe nearly of its own temperature, and, as it is cooled and descends, passes over cooler pipes. The beer is thus cooled gradually, both by contact and evaporation.

The following advantages are claimed for it:

1. It occupies very little room in a brewery, and may be used either in connection with the common vat cooler; or entirely

dispensing with that, the wort may be taken directly from the boiler, run over the cooler, and pass immediately to the "gyle tun."

2. It enables brewers to manufacture lager beer and ale in hot as well as in cold weather, and always reduces the wort to any desired temperature, say within from 4 to 6 degrees of the temperature of the cold water employed.

3. It saves a large quantity of beer, for instead of a seventh part, scarcely one-hundreth part is lost by evaporation of the wort. It also improves the flavor and quality be the preservation of the lupuline of the hop and the retention of the albuminous clarifying properties.

4. It economizes fuel, as the water used for cooling the beer escapes from the cooler at nearly as high a temperature as the beer is when it is let upon it. This water can be used for the next brewing, or for cleaning casks, &c., about the brewery. It also economizes water, as 100 bbls. of cold water will cool about the same quantity of beer.

5. It can easily be kept clean, as every part of it that comes in contact with the beer, can be reached with a brush or broom, and by running water over the cooler immediately after having used it, very little labor is required to keep it perfectly clean.

INCRUSTATION IN STEAM BOILERS.

Mr. H. N. Winans exhibited specimens of boiler scale, and stated that he had invented a remedy therefor—a powder to be put into the water used. It is a secret preparation, acting first upon the oxyd of iron so as to remove the scale, and afterwards upon the matters held in solution by the water. Whether it would answer for marine boilers he was unprepared to say.

Professor Seely, after asking questions with regard to the properties of this powder, said that he was not acquainted with any chemical substance possessing the properties claimed for this.

Mr. Stetson remarked that, in consequence of the necessity of frequent blowing-off at sea to get rid of the salt, such a powder could not well be used for marine boilers, the quantity required would be so great.

HYDRAULIC PNEUMATIC INKSTAND.

Mr. Rowell exhibited this inkstand, there being a reservoir for the ink communicating by two passages with the bowl where the ink is to be used. Whenever the ink, by use or evaporation,

falls below the upper passage, a bubble of air enters and an equal quantity of ink enters the bowl through the lower passage, keeping the bowl always supplied at a uniform hight.

COMPRESSED AIR FOR RAILROADS.

Mr. Fisher, from the committee on Carson's plan of propelling cars by compressed air, made the following report thereon:

The committee to whom was referred Mr. Carson's plan of a street rail car to be propelled by compressed air, have examined the plan so far as it is developed, and have examined reports of experiments that have preceded Mr. Carson's plans, and respectfully report as follows:

In 1799, a patent was granted in England to Mr. Medhurst, for propelling machinery by compressed air. In 1819, Mr. Murdoch, of Soho, and Mr. David Cordon, made calculations and experiments with a view to propel carriages by compressed air; but were discouraged by the difficulties of compression, which was then not well understood. In 1828, Mr. Lemuel Wright, an American resident in England, patented a plan, and built an air carriage; and a Mr. Morin, in 1829, patented a plan for an air carriage. Mr. Alexander Gordon, in his Treatise on Elemental Locomotion, in 1834, gives his opinion that there was then no plan of air propulsion that could safely be engaged in as a speculation. Since that time there have been trials in France on railways and common roads; but although they have been favorably noticed in newspapers, no permanent results have followed them.

The most successful trials of which there are authentic accounts, are those of Arthur Parsey and the Baron Von Rathen, in England, about 12 years ago. Parsey worked on a railway, and attained a speed of 20 miles per hour with a small and imperfect engine, under a pressure of 160 lbs., 200 lbs. being the limits prescribed to him, which is too low for practice. Von Rathen worked with 800 lbs. in his receiver on a common road, and arrived at the conclusion that he could run five miles on a turnpike, or forty miles on a railway, with one charge. Parsey thought that twenty miles was the useful limit for a charge.

So far as appears, both these estimates are mere opinions, and not based on the high rate of speed demanded on railways, which increases the resistance to nearly double that of the speed attained by Parsey.

A first class express train consumes five tons of water in a

stage of 40 miles. Air being denser than steam in the proportion of 17 to 8, and, so far as your committee are informed, a cubic foot of steam being equal to a cubic foot of air, it would require 10⅝ tons of air for 40 miles. The vessel to hold this air, even if welded, must be eight times heavier than the air; hence, 95 tons will be the weight of the charged reservoir for 40 miles; and a cylinder six feet in diameter and 100 feet long would be required for it at the pressure of 1,000 lbs. per inch. This excessive bulk is impracticable; a quarter or third of it is as much as could be allowed in practice; and at least two stops would be required in 40 miles.

To stop and start such a train involves a loss of $1.20 and $2.40 for two stops, or six cents per mile, which is three-quarters of the cost of coke on such trains. Besides, the time of passengers is of much greater value than the whole motive power; if the two stops should waste eight minutes, it would waste eight dollars in the time of passengers, or 20 cents per mile, which would drive the best class of passengers to the steam railways.

These considerations are sufficient to account for the disappointment of those projectors, even if there be no other defect in their system, and all they claim—a saving of one-half—be unquestionable. Mr. Carson, aware of these objections, devised a means of charging the air holders while the train is running, so that the air locomotive need not be heavier than a steam locomotive without its tender. It was this idea which induced him to engage in this means of propulsion in England. But on seeing our street railways, which are so short that there is no occasion to re-charge between the termini, he thought it advisable to introduce the air system first on these lines; and for this purpose he has designed a car whose frame is composed of six inch lap-welded tubes, in which the air is held.

If we reduce the distance to a tenth, we may reduce the weight to a tenth, or 9½ tons, for a 100 ton train. The boiler and water weigh 16 tons. Hence, we find an advantage in favor of air on short lines.

As to the cost of compression, it is less at a low density than at a high density, and there is room in a car for air at 300 or 400 lbs. But double this density is necessary for 10 miles; and at most high pressures, four times the power it can give out when worked without expansion, is required to compress it. But it is practicable, with the link, to work it expansively, so as to

give double the power attainable without expansion. Hence, theoretically, half the power will be lost. But this is expected to be balanced by the inferior cost and more thorough use of the fuel at the stations. Locomotives vaporize about 8 lbs. of water with 1 lb. of the best coke; but stationary engines vaporize 12 lbs, with 1 lb. of fuel that costs less than two-thirds as much. And when stops are frequent and long, there is a loss of heat from steam but not from air; and the fireman is not needed for air.

It has been stated that in compressing air the pumps become red hot, unless cooled by water; and that in working it, the expansion cools it so fast as to form ice on the cylinders and pipes; and that a considerable percentage of power is thus lost. The committee have no authentic data on this point; but it is evident that city cars that stop frequently are less liable to freezing than those that run fast and steadily; and that the low pressure practicable on short stages is less liable to such loss than the high pressure necessary on long stages.

The Committee, in view of all the evidence they have seen, deem that, for short lines, air may be better than steam. It is perfectly cleanly. It is likely to cost less; but if it costs more, it may still be advantageous to use it.

Compared with horse-power, it is likely to be both cheaper and more agreeable. A car propelled by air will make no dust; but the dirt made by horses is a costly nuisance. To maintain a given standard of cleanliness in a city without horses, like Venice, costs less than one-third as much as in New York for mere washing; and the wear of clothing is nearly in proportion to the washing; and if all wheels ran on iron, and by elemental power, New York might be as cleanly as Venice; and the saving of clothing, furniture and goods would more than pay for all the cost of riding, rails, pavements, and all else required for the streets.

The cost of horses, compared with steam. is much greater than people suppose, especially at high speed. The English coaches used to cost 36 cents per mile for the horses, to draw 15 passengers at eight miles per hour. Locomotives cost 12 cents per mile, and can draw 300 passengers at 40 miles per hour. On the New York Central locomotives cost 20 to 22 cents per mile, burning wood; on the Baltimore and Ohio, 15 cents per mile with coal; and some of the best engines, with 16-inch cylinders, on a southern road, have worked for 12 cents per mile. The wages,

fuel, repairs, stores—all but the interest on engines, shops, and engine houses—is included; but the coachmen used to get no pay from the proprietors, and were paid by the passengers.

Now, if we in this country pay less for horses, it is because we never have kept the high speed of the English. We waste the time of passengers, which is as good as money. Even on city railways, a third of the time might be saved by engines that can start quickly and keep the maximum speed up the grades. But poor as our speed is, it costs more than steam. Mr. Eastman states the cost per mile of running cars on the horse railways near Boston at 25 to 28 cents per mile; or as much to draw a horse car at eight miles per hour as to draw seven large cars at 30 miles per hour by steam.

The plan referred to the Committee claims to be considered as a competitor of horse-power for city railways. Those who suppose that steam is odjectionable in cities will probably be glad to find that compressed air can be used as a substitute for it, and can work for much less cost than horses, and thus drive them from street railways, and so get rid of a considerable part of the dirt.

Some of the projectors of steam carriages expected that compressed air would be substituted for steam for small carriages after steam carriages had become numerous enough to warrant the establishment of compressing stations wherever they are wanted; but until such stations are established, it is evident that compressed air cannot be used for general purposes. There are also other means known to chemists. Lardner stated that there were over twenty substances which philosophers regarded as capable of being used instead of steam, and he ventured the prediction that the steam engine would some time exist only in history. While your Committee do not deem themselves warranted in assenting to such anticipations, they certainly consider that such authorities should outweigh the mere skeptics who discourage all attempts at improvement. And they believe that the application of compressed air to street railways is worthy of trial.

J. K. FISHER,
JOHN JOHNSON,
Committee.

Mr. Dibben objected to the use of compressed air; there is a serious loss due to the heat generated by the compression. We have a loss by friction in compressing the air; then this loss

from the generated heat, and still a third loss by friction in using the compressed air.

The report was accepted and ordered on file.

PROJECTILES—RIFLED CANNON.

Mr. Babcock resumed his remarks upon the results attained by the shot invented by Gen. James. He objected to the shot, first, on account of its necessary want of accuracy. The belt of soft metal around the shot flies off as it leaves the gun, in consequence of the expansive force of the gases; and unless this belt should separate into equal pieces, their reaction would necessarily turn the shot from its course. If these pieces could perfectly balance each other, the reaction would be balanced; but this does not occur in practice, and therefore the ball must necessarily deviate from its true trajectory. The results attained confirm this statement.

Mr. B. exhibited a sketch of the target at Watch Hill, R. I., 13 by 17 feet, placed at a distance of 2,000 yards from the gun. Sixty-five shots had been fired with 80-pound shots, and there were but ten marks upon the target, a portion of these having been produced by ricochet hits. Captain Dalhgren, in an official report made last December, compares the results which were attained by trials in the Navy Yard, at Washington, of other rifled cannon with the results attained by the Board of United States Artillery Officers appointed to test General James' projectile, giving the preference to the former. The next objection is that General James' shot is deficient in penetration. This Mr. B. attributed to the honey-comb structure of the rear of the shot, causing a serious resistance to the atmosphere. No man would make the stem of a vessel in such a form. In the experiments upon Watch Hill, it was claimed that one shot had passed through 52 inches of oak timber. This was the only shot which passed through the target. The target was three feet thick, composed of squared oak timber 12 inches square, and tied together; and this shot had happened to pass between these timbers, after which it had passed through a support 12 inches thick, and another target four inches in thickness. The next best shot was imbedded 18 inches, the next best 15 inches, and the next best but three inches. In throwing shell upon the deck of a vessel, it would be necessary that the angle of elevation should be considerable. The rotation would have a tendency to cause the line of the axis to remain parallel to itself, and consequently the shell would strike the vessel partially upon its side.

Lieutenant Bartlett said that the Minie balls fired at an elevation of 15 deg. or 16 deg., all strike point on.

Mr. Montgomery thought it improbable that, in the experiments at the Navy Yard, the projectile of General James should have had a fair trial, on account of the disinclination of the department to encourage civilians in such inventions.

Mr. Babcock explained that the projectile of General James was not tried at the Navy Yard at Washington, but Captain Dalhgren merely compared his own results obtained there with other pieces, with the results before obtained by the Board at Watch Hill.

Lieutenant Bartlett said that there seemed to have been a misapprehension with regard to the Dalhgren report, since it had been used by the press to discredit General James' invention. General James aims at precision in the long range; and the great question is, whether he secures that. The French government have introduced the "Carabine à tige," which operates against field artillery, the accuracy of the aim in the long range being such that a section of French riflemen are able to hold in check artillery men that approach them over an open plain. The French government will not give up this range under any circumstances. Their sharpshooters are trained to pick off single men at from 800 to 1,200 yards; and even beyond that range they have perfectly authenticated reports of single shots which have killed single men.

TRANSPORTATION IN CITIES.

Lieut. Bartlett placed on file in the archives of the American Institute sealed papers explaining a system of public transportation, which he had invented and was engaged in perfecting. It promises to be of vast importance to large cities. This is the first instance of filing under the new rule sealed documents, under the joint seal of the party offering, and the Institute; and will be of great benefit to the discoverers of new applications of principles or mechanical agents, and even of the system of designs; for every inventor is obliged to trust somebody to develope his plan, and in filing it in the Institute, however crude, he can even say in writing under the seal, who he is about to confide it to, and make oath to it before he does so.

NEW SUBJECT.

Subject for next meeting, "heating by steam." Association adjourned.

AMERICAN INSTITUTE, POLYTECHNIC ASSOCIATION, *April* 18, 1861.

Professor Mason in the chair.

PROJECTILES AND NAVAL WARFARE.

Capt. Washington A. Bartlett.—The reports of the proceedings of the Association on projectiles has attracted much attention. I wish to read a communication which will give some important information.

JAMES' PROJECTILES.

NEW YORK, *April 13th*, 1861.

To the Editor of The Century:—

Dear Sir: At the weekly sittings of the "Polytechnic Association of the American Institute," of Thursday evening, March 28th, and Wednesday, April 3d, the subject of *steel plated ships*, or iron cased floating batteries was discussed by myself and others, of which you give a report in your issue of this date, extracted from the report in the "Scientific American." The subject of steel plated or iron cased ships and batteries, necessarily involves the highest perfection and power in destructiveness of projectiles; and hence the topic of explosive shells, solid shot, Stevens' shells, the combined shot and shell; and the last invention in cannon projectiles, destined, as I believe, to take the place of all, or nearly all, the common or bomb projectiles now in use, (and to which you adverted in an editorial article in No. 115 (March 2d) of The Century,) viz: the "General James Rifled Cannon and Projectiles," become of necessity a part of the discussion, intended—as are all the statements, discussions or remarks, made at the meetings of this enlightened body in the American Institute,—for the purpose of eliciting *facts*, and demonstrating the practical working of old or new theories; hence of great interest to the public, who, as a member of the Institute, I can assure you, are ever welcome to its sittings as a Polytechnic Association.

These reports in the Scientific American and the Century are attracting much attention; and having received to-day from General James himself, a communication on the subject, together with a set of the photographic plates, taken on the ground at the time of the trial shooting, with a sketch of the shot, the battery, the targets, and the results of the shooting, which were reported to the Department of War; I have determined to bring

the subject of the gun and projectiles again before the Polytechnic, on Thursday evening next, or as early as convenient, and—inasmuch as you cannot keep your next week's column open late enough to receive the report of the sitting—to publish the letter and explanatory notes in your next issue, to be followed by a report of any discussions which may then arise.

Very truly yours,

WASHINGTON A. BARTLETT.

The following is General James' letter:

PROVIDENCE, R. I., *April 14th*, 1861.

To WASHINGTON A. BARTLETT, Esq.:

My Dear Sir: My attention has been directed to the discussion at the "Polytechnic Association of the American Institute," of "steel plated ships," during which you were unintentionally led into an error in statements regarding the penetration of my projectiles, while members of the Institute made other statements so widely different from the facts, that I deem it due to the able manner in which *you* advocated the merits of my invention, to furnish you with *facts*, and such extracts from the official report of the Board, as will enable you to sustain the position already taken.

"In reference to the target which Mr. Babcock (I quote from the *Scientific American*) says he saw, and also the penetration and the *number* of shots which passed *through*," the following extracts from the report of the board of officers (one of whom, Lieutenant Balch, U. S. A., constructed the target, and who made the experiments), *must* be conclusive.

The report says: "For ascertaining the penetration of the shot, a target 16 feet 4 inches wide, 13 feet high, and 39 inches thick, made of well-seasoned, very hard white oak timber, was placed directly in front of the middle of the 2000 yards (distant) target, having its face fifteen feet in advance of it. This butt was composed of three thicknesses of timber, each stick 13 inches deep and 11½ inches wide;—the front and rear tiers being upright, and the middle one horizontal.

As each stick had been dressed perfectly true, in a planing machine, they fitted closely, and formed a compact mass which was firmly held together by means of four horizontal straps of oak, two in front and two in rear, through which passed twenty

1¼ inch bolts. This butt rested on a 2-inch plank floor, which was laid on 6-inch square sleepers placed six inches apart.

It was supported in rear by two braces, 8x9 inches, the upper end of which were notched under the oak strap, and the lower ends firmly abutted against a stick of chesnut timber one foot square, imbedded in the same.

"The results obtained, which are grouped concisely in the summary of target firing, (herewith,) indicate a remarkable degree of accuracy of fire, with extraordinary force and effectiveness of the projectiles, as shown by the *time of flight* and *penetration*.

"The penetrations into the "butt" of solid, seasoned hard white oak, heretofore described, were at 2000 yards distance, as follows: With eight pounds of powder, *four direct hits*, with penetration of 33, 39, 41 and 45 inches respectively; and three ricochet hits, with penetration of 6½, 13 and 14½ inches respectively; with 10½ pounds of powder, one direct hit, with 39 inches penetration. These are more minutely described in the sheet herewith, exhibiting a drawing of the target, and the remarks appended, &c., &c.

The above is authentic and cannot be controverted. In explanation of the thickness beyond 39 inches, it is only necessary to say, that two shots struck the target just above the oak strap (6 inches thick) in front, *and went into and nearly through the oak strap in the rear,—cutting off one of the 1¼ inch bolts, and going many yards beyond.*

The direct hit with 10½ pounds of powder passed *clean* through the target, as if it had been constructed of pine plank instead of toughest oak.

I enclose a set of photographic views of battery, targets, &c., also one sheet showing the hits of ten consecutive shots from the 42-pr. gun, throwing the 82-pound shot, and made without other sights than such as the knife-blade on the muzzle, and the line across the base ring, and with *dry firing*. This shows the excellence of my plan of packing, *where nothing but the lubricated canvass* touches the gun, and which in no case permits the metallic shot and the gun to come in contact.

Again thanking you for the kind manner in which you so ably sustained my interests, I am most truly yours.

CHARLES T. JAMES.

CAPT. BARTLETT, New York.

NOTES BY W. A. BARTLETT.

Note 1.—General James appears to see some error in my statement before the Polytechnic, in the matter of the penetration of the shot, but after a careful perusal of the report, and a comparison of the text of his circular, with the report of the Board of Army Officers, I am not able to discern but one error, and that may have been an error in the reporter, for I spoke without notes, although I am certain the thickness of the target was intended to be given exactly, and it must have been by adding the thickness of the back timber through which the ball broke its way, which given at six inches, would give 45 inches as the thickness of the butt,—and I remember to have understood that there were two of them, as in the report it is pierced to 52 inches, and so given in the *Scientific American.* This, however, is *immaterial;* here we have the facts, and they are amply sufficient for all I claimed for the James projectile. The report of that Board of Army Officers cannot be set aside by any one until it is shot against by an equally careful Board, and the facts of the opposition to General James' work shall appear more satisfactory than they do at present.

Note 2.—General James' *printed* circular which he has enclosed to me, says (when remarking upon the action of the shot):

"Like the well-known *rifle patch*, the expansive band, with its outer covering of greased canvas, prevents all *leading* of the gun, and being firmly pressed into its grooves, effectively expels, at the muzzle, all residuum of a former discharge.

"The efficiency of the Armstrong gun, which is generally conceded to be the most effective of the European rifled cannon, in comparison with my own, can best be understood by reference to the results produced by each; as claimed for the former by Sir William Armstrong himself, and as established for the latter by an official report to the Secretary of War, in November last, extracts of which are hereto annexed.

"In the columns of the London *Times*, Sir William Armstrong tells his own story about experiments with a gun made especially for the most favorable display of his principle, and much longer, in proportion to the weight of its projectile, than any gun in the American service. He says, '*Four shells and three shots were then fired at an elevation of six degrees, from a distance of* 1,964 *yards; all these struck within the breadth of the target; but the elevation being scarcely sufficient, they fell a little short, except one*

shell, which ranging somewhat further than the others, hit the target, and burst as usual.' These shots were thrown from a gun weighing 560 pounds, at an elevation of six degrees, with ten ounces of powder, the shot weighing five pounds. Another of his guns, five inches in diameter, at five degrees elevation, and with ten pounds of powder, threw a ball weighing 80 pounds 2,074 yards.

"With my system, as is stated in the official report above referred to, by the use of an ordinary six-pounder bronze gun, of the service pattern, weighing 889 pounds, which had undergone no other change than rifling, with powder charge of one pound and a half, at an elevation of five degrees, a projectile weighing 14 pounds was thrown 1,984 yards. And with the ordinary service pattern of the cast-iron seacoast 42-pounder gun, seven inches in diameter, at an elevation of five degrees, and a powder charge of ten and a half pounds, a shot weighing eighty-one pounds one and a half ounces was thrown 2,221 yards.

"It will thus be seen, that with the ordinary six-pounder gun, much shorter in length of bore than the Armstrong gun, a ball more than three times the area of the Armstrong ball, and consequently displacing more than three times the atmospheric air, and meeting more than three times the resistance, and nearly three times as heavy, was thrown by my plan from a gun not twice as heavy as Armstrong's, with less than three times as much powder, and with one degree *less* of elevation, 20 yards *further!!*

"It will also be seen, that with the ordinary cast-iron seacoast 42-pounder gun, seven inches in diameter, at an elevation of five degrees, with powder charge of ten and a half pounds, a shot weighing eighty-one pounds one and a half ounces was thrown 2,221 yards—or, in other words, a projectile *heavier* than its Armstrong rival, with an area *twice* as large, and displacing *twice* as much atmospheric air, and meeting with *twice* as much resistance, with an excess of powder charge of *only eight ounces*, and at the *some elevation*, was thrown 147 yards *further.*

"This comparison between established facts on one side and the inventor's *claim* on the other, needs no comment.

Note 3.—"Extracts from the report of the Board of Ordnance officers, appointed by the War Department, July 1, 1860, by Special order No. 44:

WATCH HILL, R. I., *November* 1, 1860.

"The Board say: It has been urged as an objection to this kind of projectile, that the packing separates from it, on its leaving the bore, and scatters fragments which may prove hurtful to men in front or near by the guns. The observations of the Board, on this point, lead them to the conclusion that there is no more force in this objection than will apply, for the same reason, to the sabots of fixed ammunition, or the junk wads of heavy cannon."

The board then gives particulars of range, penetration, and accuracy, of the most important of which the following is a summary:

"For experimenting with the 42-pounder sea-coast iron gun of the service pattern, a target had been constructed of well seasoned, very hard white oak timber, which was firmly held together by means of four horizontal straps of oak, six inches thick, two in front and two in rear, through which passed twenty 1¼ inch iron bolts, and placed two thousand yards, or nearly one and one-seventh miles distant from the battery.

"The penetrations of the shot, weighing 82 pounds, with powder charge of only eight pounds, into this butt of oak, were 33, 39, 44, and 45 inches respectively, and passing entirely through the target, and in some instances continuing their flight one hundred and fifty yards beyond. The last shot thrown with the 42-pounder gun, as it appears by the report, weighed 82¼ pounds, with powder charge of one-half the ordinary service charge, and at an elevation of only fifteen degrees, struck in its first graze 4,374 yards, or over *two and a half miles distant*, and with a deflection of only *twenty-four inches* to the left of true line aimed at."

The report concludes:

"From all their experiments and examinations, the Board feel fully justified in offering the following remarks in regard to Gen. James' plan for rifled cannon and projectiles:

"It is admirably adaptable to the various calibres of guns now in use, requiring only that they be rifled (which can be readily done without even removing them from the forts and arsenals where they now are,) and supplied with a proper proportion of the rifled projectiles. Beside the advantages thus to be attained, of converting our smooth-bored into rifled cannon, the weight of metal which each will then throw, without an increase of the powder charge, and with more accuracy and effectiveness, and of

greater range, will be about doubled; for instance, the 42-pounder will be 80-pounder, and the other calibres in similar proportion.

"This change will not, it is believed, injure the strength or durability of the cannon; for the Board, after careful and repeated examinations, before and during the firings, of both the bronze and iron guns, could not detect the least abrasion, bruise or other injury to the bores or other parts.

"Indeed, the packing seems to prevent the possibility of any injury or any *leading*, as no metal part of the projectile comes in contact with the bore, the grooves and bands of which are touched only by the greased canvas patch in the passage of the ball through the bore. In making new rifled cannon for use with James' projectiles, the wteght of the gun to throw the same weight of metal, may be, it is believed, materially decreased; as the guns used in our experiments have exhibited sufficient strength to withstand the firing of these projectiles, of double the weight of the spherical balls of their respective calibres. So far as we can judge, without nice instruments for ascertaining the facts, the strain on the gun appears to be lessened, in consequence, probably, of the shape of the projectile, and its close fit to the bore, with a lubricated surface interposed, causing it to glide out smoothly without the shocks due to the windings and balloting of the round balls.

"The board have no doubt of the fitness and utility of Gen. James' plan of rifled cannon and projectile for the military service, and they suggest and recommend that measures be taken at once for rifling the whole, or at least fifty per cent. of the good and serviceable cannon at our forts and arsenals, and for supplying them as soon as it can be done, with a proper proportion, of say one hundred rounds each, of the rifle projectiles."

"We have the honor to be, very respectfully, your obedient servants,

"Wm. MAYNADIER, *Capt. Ord. Pres. Board,*
"W. A. THORNTON, *Capt. of Ord. and Bt. Major,*
"S. S. ANDERSON, *Capt. 2d Art'y and Bt. Major U. S. A,*
"M. M. BLUNT, *1st Lt. 2d Art'y,*
"G. T. BALCH, *1st Lt. Ord. Corps,*
"JOHN POTTS, *Recorder.*"

Mr. Dunham said that some 18 or 20 years ago he made several projectiles, under direction of Mr. Stevens, having the same

object in view that seemed to be more perfectly, if not successfully attained by General James' shot. There were three curved wings at the rear of the projectile somewhat like propellers, which produced a spiral motion. The shots were charged with powder, which was intended to explode by concussion. One of these was fished up in the bay and brought into the city some 15 years ago, and, while the man was examining into it, it exploded. Mr. D. was not able to state whether that kind of shot operated with anything like the exactness now obtained by rifling the cannon. The difficulty with lead as a packing was that, after using it for 30 or 40 hours constant firing, it adhered to the inside and obstructed the loading. There was also danger from increased friction causing heat, and a consequent strain of the metal. Relying upon the reports and statement that he had just heard, he believed that General James' shot was a more efficient projectile with our present ordnance, as mounted on the forts and ships, than anything yet known. There never were and never would be two guns of large caliber bored exactly alike, because of the different and varying density of the metal. Our ordinary cannon could be rifled, and would then be as good as if they were originally so constructed. With regard to the opinion expressed by Captain Bartlett that, with these projectiles, the floating battery could have been destroyed in ten minutes, he must differ. A five or six inch plate, at an angle of perhaps 25° or 30°, would effectually resist all known projectiles. The best form of projectile to be used against an iron shield, he believed to be in the shape of an engineer's punch—flat at the forward end if it could be always sent directly forward; if not, slightly parabolic.

Captain Bartlett said that it was conceded that an 8-inch plate of iron was impenetrable to any shot in present use. At Fort Sumter, the iron embrasures of 8-inch iron were not penetrated.

Mr. Stevens inquired at what distance General James' shot would do execution.

Captain Bartlett said they had been used only for horizontal firing, but they could certainly be thrown further than any bomb.

Mr. Butler.—Would they not strike sideways at great range?

Captain Bartlett.—That is not my observation; at a distance of 2,400 yards I could not detect any change.

Mr. Butler.—It is said that, in the Crimea, the wounds caused

by the Minié ball, instead of being small openings as by the ordinary ball, were elongated rents.

Captain Bartlett attributed that effect to the size and shape of the ball, and not to any deviation of the point before it struck.

The President stated that, several years since, a rifle was ordered to be manufactured by the War Department, called the Lyman gun, with three successive charges and explosions. Experiment showed that an inch ball was fired through sixty inches of hard wood, and that the range was four miles. One of these guns burst at the first charge. The results of modern science in warfare seemed to be that the strongest and most available force must conquer at last, and that with comparatively little bloodshed.

Mr. Nash remarked that if Major Anderson had had 300 more men in the fort and had been supplied with shell, his garrison could have resisted for an indefinite period all the forces that South Carolina could bring to bear. The idea that the world was coming to an end because bloodhounds bayed was ridiculous. God does not interfere with battles at all. When the ship *Constitution* was built of the toughest oak that ever grew on the sterile granite hills of New England, and was mounted with the largest guns that had ever before been used for the same amount of tonnage, and so arranged that five of these guns could concentrate at a certain distance and all hit a target the size of a hat, it was no wonder that she whipped the *Guerriere*. Timber and gunnery won the battle.

The President adverted to the fact that chemists were now directing their attention to the purification of metals by new combinations. As regards iron, the Franklinite of this country was acknowledged to be the best in the world.

Captain Bartlett considered that there had been a great mistake made by our government a few years ago in ordering six ships, built at a cost of about $1,200,000 each. Twenty-four small ships with a few guns on each, would now be able to line and blockade the whole southern coast. A vessel with the highest speed and the longest range of guns would whip anything.

Mr. Butler inquired if the covering or packing of General James' projectile was any larger in proportion than the patch of a rifle ball.

Captain Bartlett—Hardly as large.

Mr. Butler conceived, in that case, that it would cause no material deviation of the shot.

The President remarked in relation to packing, that, on the New York Central Railroad, some of the boxes on which the wheels had been constructed, and used for the last eight months, of rings of metal filled in with a substance like *papier mache.* The result was that there was a saving in the wear of from six to seven-eights over the solid metal boxes. That might be suggested of the saving of the wear of the cannon by a soft packing.

HEATING BUILDINGS BY STEAM.

Mr. Dibben remarked that insurance companies had expressed considerable anxiety of late in reference to the comparative safety of different modes of heating, and they have an impression that there is danger from accidental if not spontaneous combustion in buildings heated by steam pipes in contact with wood. Mr. D. expressed the opinion that, in consequence of a partial decomposition of the wood near steam pipes, spontaneous combustion might be possible—as, for instance, in the pine knots—the heat from the steam pipe falling short of the degrees of ignition.

Mr. Baker stated that he had been engaged for six years past in putting in steam pipes, and he ran them through woodwork and among shavings without any fear of combustion. He had never yet known a case even of charring. It would require a pressure of from 70 lbs. to 100 lbs. to produce combustion. Six years ago he called the attention of insurance companies to his mode of using steam without pressure, and they were so well convinced of its safety that they made a reduction of 10 per cent. in the rate of insurance.

Mr. Fisher had seen a few cases of charring and turning to ashes from steam, but it was probably caused by superheated steam. Low pressure, with superheated steam, he considered as liable to set fire as high pressure. He had heard of buildings being set on fire by Perkins' hot water apparatus. He considered it desirable that the pipes should always pass through something that could not be set on fire, or there was danger from superheated steam.

Mr. Baker said that it had been stated in the Scientific American that steam pipes were dangerous, and an open fire was the safest. In the year 1858 or 1859 there were about 200 deaths in the city of New York by setting fire to clothes.

Mr. Brown said that he had laid wood against a pipe for 12 hours, heated at 700 deg., without being able to set anything on fire, though the wood was charred. He had also applied gunpowder with the same effect. He used precisely the same pipes that Perkins used for his steam generators. We had yet to learn whether carbon is more susceptible of ignition than the wood before it is charred.

Mr. Johnson.—Charcoal made at a low temperature will ignite at a lower temperature than when made at a high temperature. Perkins' steam generator heated steam to 600 deg.

Mr. Baker.—A pressure of 70 lbs. will create a temperature of 300 deg. I do not believe there has been a single instance of high or low temperature where the steam pipes have caused ignition.

Mr. Johnson.—It should not go out that we have nothing in our buildings which will ignite from steam pipes, when the temperature is very high, as from superheated steam.

Adjourned till Thursday, April 25th, at 7½ o'clock, P. M.

American Institute, Polytechnic Association,
April 25th, 1861.

Mr. R. L. Pell in the chair.

SOD-SEEDER AND BROADCAST SOWING MACHINE.

Col. John C. Duane, of Schenectady, N. Y., exhibited and explained a model of a machine with the above title.

Description of the machine and its operation.

The principle upon which the machine depends for its ease of draft, and enables one pair of horses to operate it, consists in having its whole weight, like Fawk's steam plow, balanced upon the broad surface of the roller, which is only heavy enough to crush the clods of earth and prepare the ground for the mower. The cultivator teeth loosen the ground, and by their peculiar curved form pass over every obstacle. The drag having four rows of teeth, which if placed in line, would be but one inch apart, leaves the ground in the condition of a garden. The roller completes the operation of tilling the earth, and is followed by the plaster machine, which has both a rotary and horizontal movement, which renders it impossible to choke.

Calculation of the labor-saving properties of the machine.

One acre of ground is 160 rods, or one-half mile long, and $16\frac{1}{2}$ feet, or one rod wide. Man and team travels,

	Miles.
To cultivate an acre in the ordinary mode and with the ordinary implements, a cultivator $5\frac{1}{2}$ feet wide, making three bouts or	$1\frac{1}{2}$
To drag $5\frac{1}{2}$ feet wide, passing over twice,	3
To roll eight feet wide,	1
To drag in grain—if lapped or passed over twice,	3
To brush or drag in grass seeds, do do	3
	$11\frac{1}{2}$
In addition to which the man travels,	
To sow grain eight feet wide the man travels with heavy bag on shoulder,	1
To sow plaster eight feet wide,	1
To sow grass seeds, eight feet wide,	1
Making a total of	$14\frac{1}{2}$

Team travels $11\frac{1}{2}$ miles; man $14\frac{1}{2}$.

To put in an acre with the machine four feet wide, in the most perfect manner, the farmer has, in addition to the other advantages, no labor to perform but driving, and the team travels but $2\frac{1}{12}$ miles; with a six foot machine, one and two-fifths of a mile. So if the team can travel 18 miles a day, the farmer can put in $8\frac{3}{4}$ acres per day; with a six foot machine and three horses $13\frac{1}{5}$ acres can be accomplished.

Communications in relation to the sale of State and county rights, for manufacturing, vending, &c., may be addressed to the subscriber, at the city of Schenectady, State of New York.

JOHN B. DUANE.

April 12, 1861.

SOD-SEEDER AND BROADCAST SOWING MACHINE.*

This new and labor-saving instrument is now offered to the public. Its points are:

* This machine was patented April 12, 1859, and October 2, 1860. After putting in one of the finest crops of oats in the county in the spring of 1860, and rye in the fall, it received a diploma at the Albany county fair, and the large silver medal at the State fair at Elmira, and ordered to be noticed and described in the next volume of the State Agricultural Transactions.

1st. It cultivates the ground after spring or fall plowing.

2d. It sows the seed, either throwing it under the cultivator teeth, and plowing it in, for peas, &c., or by simply turning a guide-board it passes directly under the drag, and sows it at equal depths near the surface.

3d. It covers the seed by a fine-toothed drag, which does not allow any lump to pass larger than one inch square.

4th. It sows the clover and timothy seed in separate compartments.

5th. It rolls the ground, preparing it for the mower.

6th. It sows the plaster, guano, phosphates, &c., in the most even manner, without the possibility of choking or any annoyance from their dust.

7th. It clears itself from all obstructions.

8th. The team always being in advance, the ground never is poached with the horses feet.

9th. The seeds and plaster can be sown in a gale of wind.

10th. The farmer has no labor to perform except that of driving and filling up the seed boxes.

11th. It is easy of draft; by dynamometer test it requires but 50 pounds to draw it on the floor; 120 pounds on the road, and on average soils less than 500 pounds when in full work.

12th. By the turn of a thumb-screw the quantity of any kind of seed can be regulated at pleasure, seeding from one peck to five bushels to the acre.

13th. By a peculiar construction of the cultivator and drag-teeth, an inverted sod can be cultivated, without disturbing it, which, when pressed under, is estimated to be equal to twelve tons of manure to the acre.

14th. The farmer can sow until the storm actually comes on.

15th. The combined weight of the whole machine is only sufficient to crush the clods that it may pass over.

PROJECTILES.

Mr. Clark submitted a model (in wood,) of a projectile in the shape of a cylinder, surrounded by a packing case of soft material, intended to expand so as to stop the cartridge, and to leave the shot free as it comes out of the gun. The expansion is caused by a tendency of the shot to force itself out of the packing case and leave it behind, operating like a wedge, and spreading the fore rim of the packing. Two longitudinal slits enable the packing readily to expand.

The shot consists of several layers joined by a pin, so that when it ttrikes it may separate into several parts.

Mr. C. claimed an advantage in having the shot cylindrical, in keeping the exact center of gravity in the center of the body of the shot. In casting round shot, the denser portion of the metal sank to the bottom, thus removing the center of gravity from the center of the body. One object sought for in this invention was to dispense with the rifle bore.

The invention had been submitted to Mr. Toucy, late Secretary of War, who referred it to two army officers.

C. W. Smith submitted a drawing of an explosive projectile. It is formed substantially like the Hotchkiss shot, and contains similar lead packing, but it is cast hollow, and the hollow is intended to be filled with hexagonal bullets. A small chamber contains gunpowder, which is to be ignited by a fuse, so as to scatter the bullets just before reaching the enemy.

Mr. Stetson thought it was important to expend our energies in the direction of the inventions of Hotchkiss and James. The Scrapnell shot is a shell filled with bullets; percussion caps had been attached to the bullets. The matter of exploding by striking was yet in its infancy. For some purposes it was not useful. Practically, a shell was found to sink about its depth before it separated.

Mr. Garvey remarked, that in reference to Mr. Clark's cylindrical shot, that the inventor had attempted something that never could be done, viz: determining the center of gravity by gravitation. It was determined by the cooling mass, so that it made no difference in what position the shot was cast.

Mr. Clark insisted that by casting the shot in a cylindrical shape, upright, the shrinkage is comparatively uniform.

A gentleman inquired if there was any way of preventing the lead packing from coating the inside of the gun.

Mr. Stetson stated that just forward of the lead ring in Hotchkiss' ball, there is placed some grease, and held there by some loosely sperm wicking. This greases the gun just forward of the lead, and it is found that there is no coating of the inside of the gun, even after forty or fifty trials.

H. L. Stuart stated that Messrs. Lee & Larned were engaged in constructing flying artillery gun, embracing the idea of the Lyman accelerating gun, by which they hoped to be able to throw balls one and three-quarter inches long, by five-eights of an inch

thick, a distance of a mile and a half, point blank, at the rate of seventy-four a minute. The gun and whole apparatus weighed nine hundred pounds.

Mr. Minthorne said that Thomas J. Mayall, of Roxbury, Mass., had constructed a battery of six cannon, self-loading and self-firing, capable of firing one shot a second.

VESSELS OF WAR, &C.

Mr. Stetson remarked that this government had now about eight ships of the line, seven brigs, and twenty sloops of war of various sizes; also about six first class steamers, five second class, and fifteen third class. A large portion of the vessels were good for nothing. He would move the appointment of a committee to report with regard to what can be done or should be done in the way of developing our resources of defence and offence. We are in the midst of a war, and at the outset we are in a position at once humiliating and embarrassing.

Mr. Stuart considered our present wooden ships no better than floating grave yards. They ought to be changed. This club should appoint a committee and rout old fogyism, official sham, and red-tapeism.

Mr. Stetson said the value of our vessels depended upon the character of the enemy we had to meet. Our present wooden vessels were good enough for the purpose of waging war with the cannibal Islands, Paraguay or Mexico, but not with any great European power. The knell of wooden ships was rung when it was discovered that bombs, filled with combustible material that would burn ten minutes in spite of everything that could be done, could be shot from a cannon. But for our present enemy we had ships enough, perhaps. If not, the resources of the mercantile marine could be brought out. There were one hundred and ninety steamers in New York—twenty of them propellers, and twenty side-wheel steamships. They could be made as efficient in a short time, as they were in the Mexican war. A month or six weeks probably would be sufficient for that purpose.

Mr. Fisher thought that a report of a committee of this body at the present time would be inexpedient. It would only convey information to the enemy. The business of the government now was to fight as well as it could with the present means. At all events, the committee should avail itself of the advice of the most talented engineer, and he would suggest that as an amendment.

Mr. Garvey opposed the motion, on the ground that it was impracticable. It seemed to him that the duty of the committee should be, to ascertain what means could be employed in New York city for efficiently arming men—to ascertain what workshops there are in the city and country and report upon the same.

Mr. Fisher said that was only one part of the duty of the committee. It should also report upon naval architecture. He did not think that anything that could emanate now from this society would have much effect, while the government had its hands full, but it might be well to address the wealthy men of the city.

Mr. Seely thought that the objectionable feature of this motion was, connecting the business of this club with the government. He considered it unwise to assume to teach the government. Nor had the government time at present to listen to us. He believed moreover that before we were ready to offer our advice and assistance, it would not be needed.

Mr. Godwin insisted that the society had no right to report upon these matters. He hoped we would simply invite communication, at the next meeting, in any manner connected with the interests of the government.

Mr. Dibben differed with Mr. Godwin; this society had appointed committees to report upon similar matters. The object was not to advise the government but to recommend.

After some further discussion, the motion of Mr. Stetson was adopted, and the chair appointed the following gentlemen as members of that committee: Mr. Stetson, Mr. Stuart and Mr. Dibben.

Adjourned till next Wednesday, May 1st, at 7½ o'clock.

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